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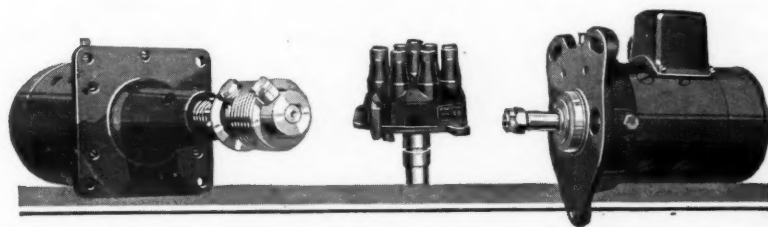
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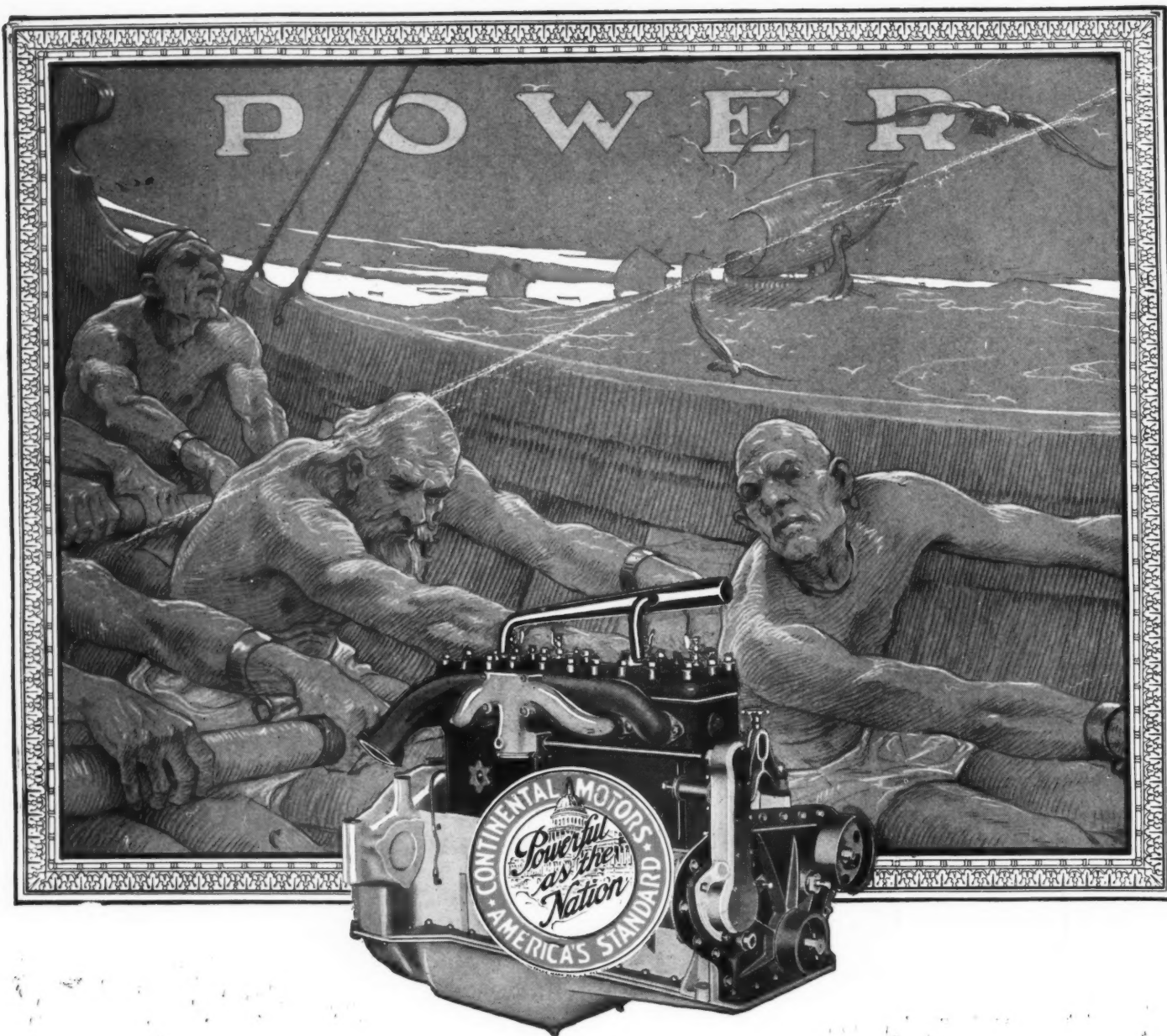
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# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

VOL. XLII

NEW YORK—THURSDAY, APRIL 29, 1920

No. 18

## Starting the Standardization of Hub and Axle Design

A campaign for this necessary and important work was started by Mr. Schipper in AUTOMOTIVE INDUSTRIES of April 1. Since that time, he has received many letters and communications emphasizing the desirability of the course he proposes. This article points out how and why this vexatious problem should be attacked immediately.

By J. Edward Schipper

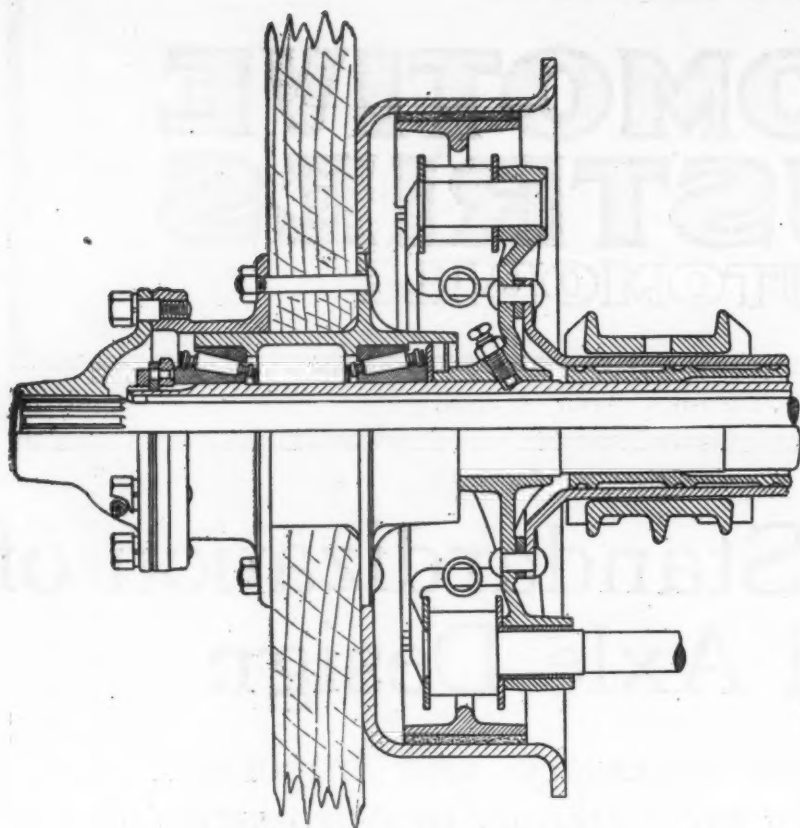
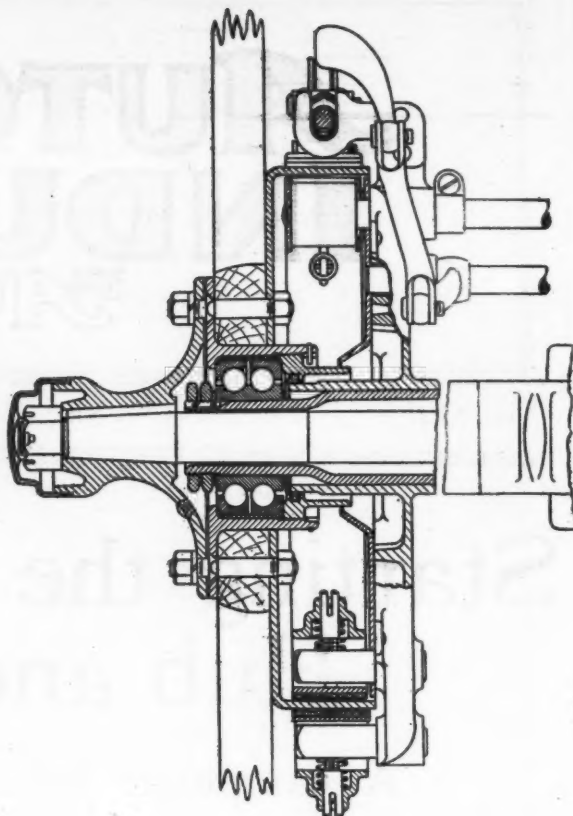
**A**N immediate start should be made on the matter of truck hub standardization. This is evidenced by the fact that there is probably more interest in the subject now than there has been in any standard in the history of the automotive industry. It is a critical time, particularly in the truck field, where new equipment is being designed to take care of the coming series of pneumatic-tired commercial vehicles.

While there is only a remote possibility that the ideal ever will be reached, some dimensions could be standardized almost at once, with a little co-operation among the axle manufacturers. The hub flange diameter, the hub bolt circles and the widths of spoke are three factors which lend themselves readily to standardization and which vary at present through a considerable range. No more than one or two axle manufacturers would be penalized to any extent by the standardization of the hub flange and in their cases it would be necessary only to add a small amount of metal to take care of the slightly increased diameter.

There is a tendency among the axle makers

to stand pat and to say that standardization beyond the possible three items just mentioned would not be desirable, inasmuch as it would tend to throttle development. This stand is not justified in view of the immense cost to the industry by lack of standardization on these parts. Where individuality of design costs the industry as a whole a great amount of money, it would be better to have the part standardized, even though some features of the design were not ideal, as the eventual cost would be less not only to the manufacturers as a whole, but to the ultimate consumer.

When all is said and done, the interest of the industry, taken at large, is best served when the ultimate consumer is best served. The ultimate consumer is best served when he obtains the most satisfactory product for the least possible expenditure. In regard to axle hubs, we know that some of the cheapest hubs to construct are used on the most expensive and most satisfactory trucks. With this in view, it is logical that individuality could well be sacrificed to bring the industry toward a more standardized basis.

*Timken full floating rear axle**Salisbury rear axle*

Nothing about a hub design is exceptionally intricate. There are many satisfactory types and few, if any, unsatisfactory types, as regards performance. As regards design and manufacture, however, some types are more expensive and intricate than others and, although it seems almost presumptuous and possibly extreme to suggest it, there is every reason to indicate that a strenuous effort should be made to get the axle builders together to determine if it would not be possible to co-ordinate many of the ideas now being used, as regards bearing spacing, mounting, etc. The bearing manufacturers themselves are vitally interested, particularly in cases where the outside diameters of the bearings vary within a few thousandths of an inch.

It is the belief of many in the industry that, if the axle manufacturers once made a start to the extent of standardizing the hub flange, bolt circle and spoke width, it would be possible gradually to go farther. It will not be possible to do this in a day and likely we always will have several types of rear axles for both passenger cars and commercial cars. For the commercial car, we have the internal gear types of axle added to the design usually used in passenger car practice.

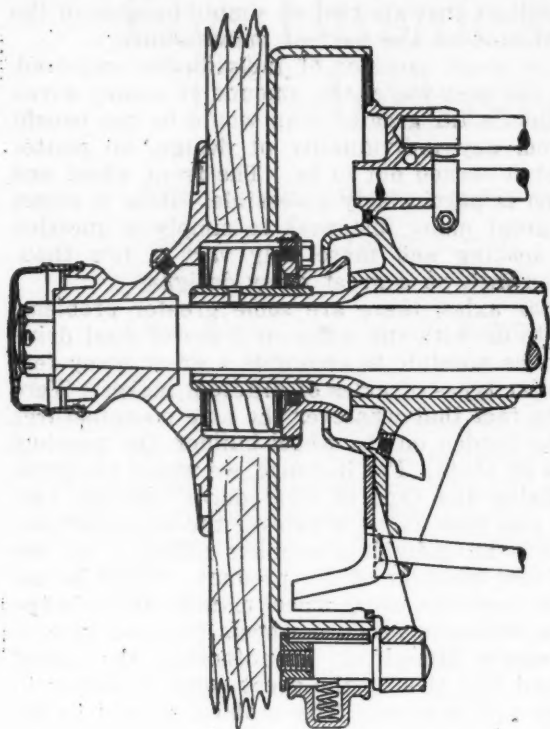
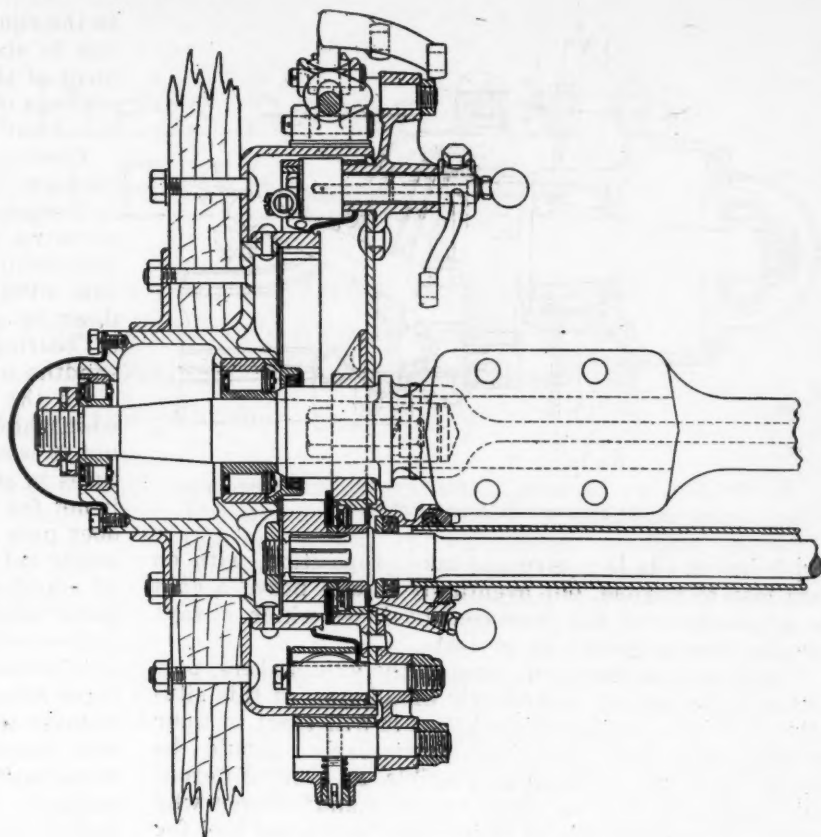
It is readily realized that it is not possible to go back and alter designs which have been used in the past and for which the wheel makers have already largely equipped themselves in the way of patterns, jigs and tools. On the other hand, right now is the time when the problem should be studied, particularly in the commercial vehicle field, where the new pneumatic equipment is about to be designed. It would be unfortunate if the unstandardized condition prevailing in the present solid tire axle, should

be repeated with the pneumatic equipment. Furthermore, it is an injustice to the wheel manufacturers, wood or metal, to force upon them the necessity of assuming the expense of pattern and manufacturing equipment for a great variety of axles when, with proper co-operation among the axle firms, it would be possible considerably to reduce the necessary number. In the solid tire situation, we not only have the variety of axles, but we have all the different types of wheel equipment to take care of the small and large, single and dual tires.

At this time, and probably for several years to come, the problem of the truck and passenger car manufacturer is not where to buy his parts but how to get deliveries. In other words, there is not a parts maker who has not ahead of him all of the business that he can take care of. He has no necessity for sewing up any individual manufacturer with designs of such an unstandardized character that they make it practically impossible for him to change his source of supply. In other words, there are no selfish reasons which will stand the light of investigation why manufacturers cannot co-operate. It may not be desirable or necessary that the axle makers should discard their individual preferences as to design but it is highly desirable that, where particular dimensions vary by a small amount, these should be made in the future to coincide wherever possible. It also seems desirable that some of the manufacturers who are clinging to designs originated a great many years ago, should revise them to the simple and proven types of more up-to-date usage.

Wheel makers generally are looking with great concern toward the pneumatic-tired truck wheel situation. They have been through the expense of buying special pattern equipment, machining tools and jigs for each size and make of axle for the solid-tired truck, as well as for the passenger car. Naturally they fear the great



*Weston-Mott rear axle**Torbensen internal gear rear axle*

variety of axle and hub designs probable with the pneumatic development, particularly as it seems likely that, in developing the pneumatic-tired machine, practically all parts of the truck will be materially affected.

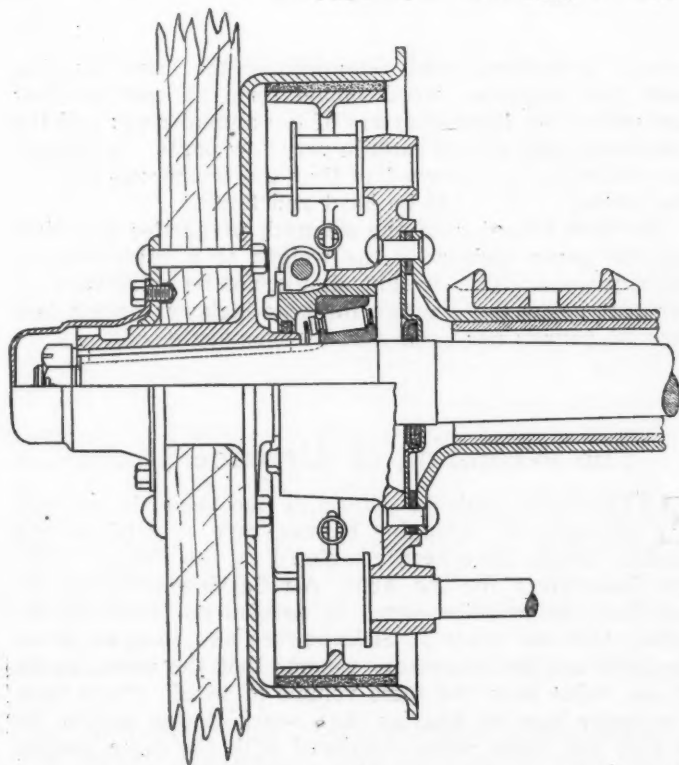
Since the wheel industry is affected as seriously as it is, it seems no more than fair that the axle manufacturers should work with the wheel makers in an effort

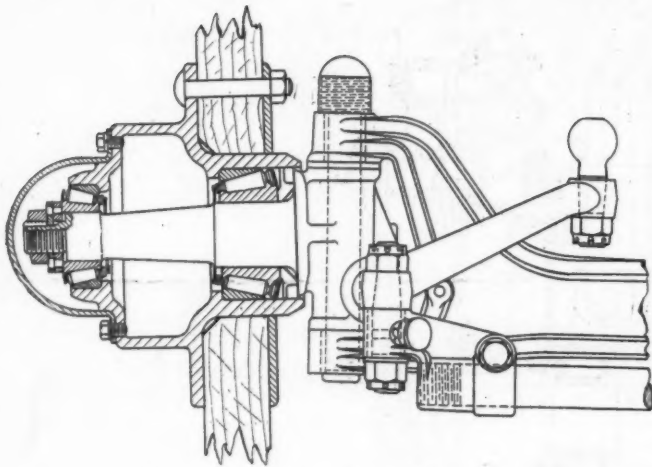
to simplify the situation as far as possible. There are points which can be readily cleared away and there are others which are going to be extremely difficult but every step taken will result in the saving of thousands of dollars, which ultimately has its effect on reducing the cost of the product to the consumer and incidentally leads to increased demand and increased business for the manufacturers.

The tire and rim phase is not in as chaotic a state as the hub, and the problem is not so complicated, but there is much to be done. For example, the width between the inclined faces is different on the five sizes of rims for pneumatics and, consequently, calls for different facings in each case on the wheel felloe. There seems to be no logical reason why the distance between these surfaces should not be the same on all of the rims. Probably the tire maker fears there would be a temptation to under-tire the truck, but it would seem there would be other means for preventing this. It would also be possible to go further toward standardizing the bolt circles for the demountable rim retaining lugs.

To sum up the situation, it is a joint problem concerning the axle manufacturer, the tire manufacturer, the wheel manufacturer and the bearing manufacturer. They are all vitally interested. It starts with the axle maker, who is in the key position. Whatever he decides must serve as a guide to the others, because they are making the equipment that goes on the axle manufacturer's original design.

As pointed out, it is not desirable, or is it suggested, to change past equipment, but it is suggested that now, when the pneumatic tires for trucks are coming strongly to the front, co-operation in design should be extended by each of these four classes of manufacturers to the eventual reduction of cost to all and correspondingly to the

*Timken fixed hub rear axle*



Torbensen front axle

truck buyer. It is a give-and-take proposition, with no real loss to anyone, but eventually it will prove a gain to all, because of the increased business which always results from a reduction in cost.

It will be necessary for some of the axle makers, particularly, to take an exceedingly broad view of this situation but it is just as evident that it will react to their benefit. The hub situation, particularly, should be straightened out as much as possible, as every different hub puts a burden on every wheel manufacturer who desires to make wheels to fit it. Each one must tool for that particular hub at a cost ranging anywhere between \$2,000 and \$4,000 or \$5,000. If there are twenty wheel manufacturers making wheels for that particular hub, there is a possibility of \$100,000 being sewed up simply

in the equipment to manufacture wheels for it and, if we run to sixty or seventy varieties, as is now the equipment of the average wheel concern, it is easy to see the millions of dollars that are tied up simply because of the stand-pat attitude on the part of manufacturers.

There is no great sacrifice of individuality required, because, in the first place, the amount of money saved in co-operation is far greater than would be the benefit accruing from any individuality of design, no matter how brilliant it turned out to be. The front wheel and axle situation is particularly accessible. Here it comes down in a great many instances to simply a question of bearing spacing and these only vary a few thousandths of an inch on a great many designs.

On the rear axles, there are some greater problems which have to do with the different types of final drive but it would be possible to reconcile a great many features in similar types of axles of different makes. Were it not for the fact that whatever the axle manufacturer does puts the burden on the wheel builder, the problem would not be as acute. For instance, we would not think of standardizing the type of final drive between propeller shaft and rear axle. Whatever the manufacturer does on this is an individual problem affecting no one but himself and the user of his product. When he designs an axle, however, every wheel manufacturer in the country who wishes to produce wheels for that type of axle must equip himself to manufacture the wheel mountings and this ties up the great sums of money in patterns, jigs and fixtures. The problem should be attacked vigorously because of the coming crop of new axle designs. Now is the time when every executive should scan his product to see if it could not be simplified, not only for himself, but for the other manufacturers who make corresponding parts.

## The Use of Hickories in Vehicle Building

**T**HE principal species of hickory are divided botanically into two groups—true hickories and pecan hickories. True hickories include shellbark, shagbark, mockernut and pignut or black hickories. Pecans include bitternut, nutmeg, pecan, and water hickories.

The chief difference between true and pecan hickory, as shown by tests at the Forest Products Laboratory, is in toughness or shock-resisting ability. This is the property which is so valuable in wood handles and vehicle parts. In this property, true hickories are far superior to the pecans.

The strength properties of pecan, according to the laboratory tests, are somewhat in excess of those of oak or maple, and for such articles as handles and spokes, carefully selected pecan is probably to be preferred to either of these two woods. In heavy wagon parts, maple and oak are reputed to stay in place better than hickory. Except in case of extreme shortage of maple, true hickory, and oak, it would probably be inexpedient to use pecan hickory for these heavy parts.

The sapwood or white wood of hickory, which is usually preferred by the trade, is the better wood in young, thrifty trees but in over-mature trees it is inferior to the heartwood. A red color does not necessarily make sound hickory unsuitable for vehicle stock.

A more useful criterion than color is the proportion of summerwood, or nonporous wood, in the annual growth

rings. In hickory stock intended for the more exacting uses, the nonporous wood should form at least one-half and preferably three-quarters of the annual ring; and the remaining part should contain very few pores. A further precaution to be observed is that the nonporous part of the annual ring should be hard and flinty.

The best criterion of the strength properties of either true or pecan hickory is the weight of a cubic foot of the dry wood. This weight should not be more than 10 per cent below the average for true hickory; or not less than 45 pounds per cubic foot of oven-dry wood.

## The Wrapping of Airplane Struts

**E**XTENSIVE tests to determine the value, in gaining strength, by wrapping canvas, tape or cord around airplane struts have been completed by the Forest Products Laboratory for the Army Air Service, with the result that the practice seems to develop no beneficial results. Use was made of Sitka spruce and Douglas fir in the tests and the laboratory reports that the wrapping is of less value than the same volume of wood. Since such a covering may be heavier than wood, it was said to be of still less value when compared with the same weight of wood.



# The Business Press as an Aid to Industrial Efficiency

Recognizing the business papers as a powerful factor in industry, the Chamber of Commerce of the United States held a group meeting of such publications at its Atlantic City convention. This article briefs some of the ideas and ideals expressed by the publishers and editors.

**T**HE functions of the business press—as a stimulant to production, as a factor in co-ordinating the successive steps of manufacture from the raw material to the finished output and as an aid in bridging over the stress of the present economic situation—were outlined on April 27 at the Press Group Meeting of the Atlantic City Convention of the Chamber of Commerce of the United States of America. The discussion was headed by the publishers and editors of many industrial and business papers.

One of the speakers was M. C. Robbins, publisher of *Gas Age* and Vice-President of the Associated Business Papers. Mr. Robbins took labor conditions as his subject and outlined the duties of the business papers in righting the difficult situation now existing in that field.

"The slackening of production in many essential industries is hurting the workers along with the general public," he said. "I believe that an appreciation of this situation has reached the minds of the workers, both skilled and unskilled, and that they are genuinely anxious to do their share in righting conditions.

"There is need, however, for sympathetic co-operation between the employers, the employees and all factors entering into production. There could be no higher function for business and industrial journals at the present time than to exert their great influence toward bringing about a better understanding between these factors and in pointing the way to the solution of their common problems."

The obligation resting upon these papers was made clear by H. M. Swetland, President of the United Publishers Corp. and of the Class Journal Co., which publishes *AUTOMOTIVE INDUSTRIES*. He was general chairman of the press meeting. Mr. Swetland stated that the American industries are being carried "largely by the stimulation of a war market" and that "this inflation must be faced in one of two ways—either a wholesale reorganization is involved or production must be increased to meet this inflation." The present level of living costs, he believes, will not be reduced until a higher efficiency is attained by the producing forces of the country and, naturally, of the world.

"No greater obligation ever rested on any phase of industrial existence than rests to-day upon the press of this country, whether the publications

are secular, educational, general or industrial. The necessity of economic production must be told and retold. The publisher, standing in the perspective vantage ground, can foresee and foretell better than any individual operator the necessities confronting the great industries. He must utilize his organization for careful investigation, familiarize himself with the economic processes, and he then must be fearless in his denunciation of improper methods and practices."

The raw material situation was taken up by Charles H. Clark, editor of the *Textile World Journal*. He declared that higher co-ordination between producer and user was necessary.

"The most highly developed modern types of big business have not only frequently lost their sympathetic touch and relationship with labor but also with the producers of their raw materials," he said. "An adequate and continuous supply of labor and raw materials is essential to the conduct of any business and lack of such co-ordination and control is an important cause of interrupted production and high costs."

Another potent factor in the difficult situation as it exists to-day is that of transportation. It was taken up by Roy V. Wright, managing editor of *Railway Age*.

"Railway transportation is to-day the limiting factor in production," Mr. Clark declared. "In many of the industries of this country, this condition, acute as it is in some respects, promises to continue for a considerable time. The underlying causes for this shortage of transportation are the lack of sufficient equipment and facilities and the low morale which now exists among railway workers.

"The lowered morale among the employees is not very different from that existing to a greater or less extent throughout the business and industry of this country. Increased production and a lower cost of living will not be brought about until this condition is changed. The business papers have a distinct responsibility in educating the men in their respective fields to the necessity of doing their part in raising the morale of the forces generally; this will react favorably upon the railroad field."

Others who addressed the Press Group Meeting were Charles H. Phillips, President of the *Dry Goods Economist*; Arthur J. Baldwin, Vice-President of the *American Machinist*; John H. Fahey, publisher, of Boston, and Merle Thorpe, editor of *Nation's Business*.

# The Commercial Airplane in Its Present Day Development

Throughout the period since the armistice, the plane builders of Europe and America have striven for reliable and economical machines to undertake the tasks of industrial transportation. This review records some of the achievements in this field, revealing the advancement of the past months.

By George E. Quisenberry

**A**IRPLANE development since the armistice halted the military programs has been largely a search for commercial models combining high carrying capacity with steadiness and reliability of operation. Such a course has been a natural one that could scarcely have been otherwise when the financial factors determining peace-time production are taken into consideration. The airplane builders, not only of the United States, but of Great Britain, France, Italy and Germany as well, have attempted to construct machines, taking their war-time lessons as a basis, that would be feasible for passenger and express enterprises, thus establishing the markets that would enable them to keep their factories in operation.

Many of these higher-powered machines have been announced within the last few months and some of them have reached the production stage, although a few have not completed their test flights. But the engineering work already accomplished is of wide scope and is prophetic of a future in which huge planes carrying large cargoes are a reality. Whether the best type for such a machine has been evolved, remains a matter of debate, but it is evident that the designers have traveled far in their almost unsupported efforts to solve the problems of air transport.

A review of the larger ships that have come out of the world's plane factories since the armistice, constructed as a result of peace-time competition rather than the urge of military necessity, shows that certain types and certain tendencies are becoming almost standardized. Although the various makers have brought out ships according to their own ideas of construction, the range of these models is not high. A composite would approach closely an average type from which the deviation of the individual maker is small.

This average machine would be a biplane, mounting two tractor engines of a fixed type on either side of the center nacelle or fuselage in which the passengers or cargoes are carried. This is the construction that Curtiss, Martin, and Lawson, in America; Vickers, Handley-Page and Grahame-White, in England, and some makers in France, have used for their large passenger ma-

chines. Caproni in Italy; the Airco machines, in England; Bleriot, in France; Thomas-Morse and L. W. F., in the United States, and Aviatik, Linke-Hoffmann, Siemens Schuckert and others, in Germany, have developed different lines. But, throughout most of the transport machines of the post-war period, a current of somewhat similar design may be traced, and the fixation of models shows that wise construction already has been attained by the industry's engineers.

This article will attempt to group a few of the apparent tendencies with a study of some of the newer machines. Although most of the machines have been described previously, no attempt has yet been made to consider them as a group. Development of the smaller sport and military planes will scarcely be touched, and only those machines will be considered that seem to have a commercial future.

Basic principles, at least, have undergone but few variations from the military effort, except as greater capacity and more reliability have been worked out. Numerous changes and rearrangements of engine fittings and mountings, together with refinement of parts, have been made. Engine powers have grown higher and the installation of more engines has kept pace with the race for larger capacities, excepting that in America no civilian plane has carried more than three power units and only one seems likely to continue with more than two.

Wing and tail structure, so far as fabrics and such materials are concerned, have undergone almost no change. Only the Germans have gotten far with the all-metal structure and, although the manufacturers of every country have watched the Germans as closely as

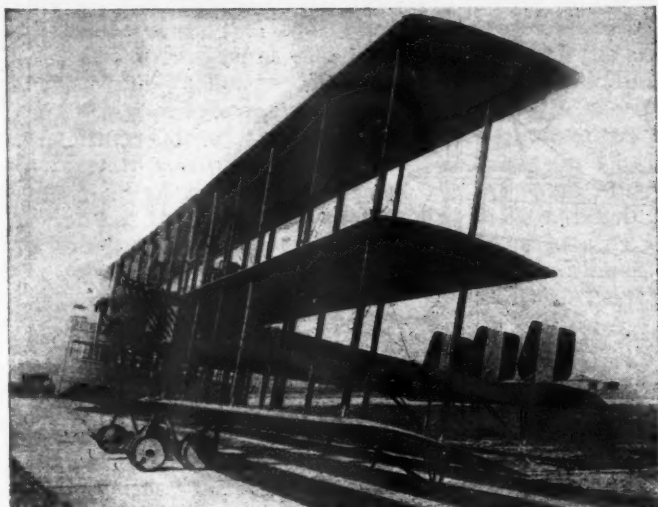
has been possible under the chaotic conditions existing in the former Kaiser's realm, no other nation has produced a commercial plane of such material. The British, according to a recent report, have constructed a small military plane, equipped with an Hispano-Suiza, 200-hp. engine, along the German lines, but little is known of it here.

The American military service also has been reported as experimenting with a metal fuselage plane but having fabric wings.



*The Airco nine-passenger single engine plane designed for the London-Continental service*





*One of the Caproni triplanes having a seating capacity of 20 passengers. This design has been modified or changed so that several other models resemble it closely*

Technical knowledge concerning the Junker, as the German metal plane is known, has been circumscribed and only recently have descriptions of it appeared in this country. As will be remembered, the only plane of this type believed to have reached America was wrecked in its trial flights on Long Island. Future construction along such lines can be guessed at only and it would be dangerous to predict that the world's makers soon would desert the fabric-covered construction that proved out so well during the war.

The big passenger machine has remained almost entirely of biplane form. Caproni, it is true, has gone into the construction of the three-surfaced type, with one triplane at least seating as high as forty passengers, in addition to numerous of smaller size and a larger one, partially built, to carry 100 passengers. The Tarrant Aircraft Construction Co., of England, according to an American trade paper, also has designed a large triplane, which would carry six Napier engines totalling 3000 hp., but its details are not available. Consequently, the Italian—and his ability is admitted and his talent recognized throughout the airplane industry—appears to be almost alone in taking up the triplane type, although, in doing so, he seems to have pushed the weight-carrying capacities to limits approached only on paper by other designers.

One reason, perhaps, for clinging to the older and better known biplane has been that wing structures and supporting surfaces were so well developed during the war that little change has seemed necessary. The fabric-covered biplane proved its worth long ago; its forms have become more or less standardized, and the necessities for obtaining reliability and economy of operation have concerned more importantly the powering factor. Wing structures, as now employed, are of such excellence that they do not determine the life or ability of the machine, as they seldom fail, and, except in crashes due almost always to other causes, the lifting surfaces seldom go to pieces.

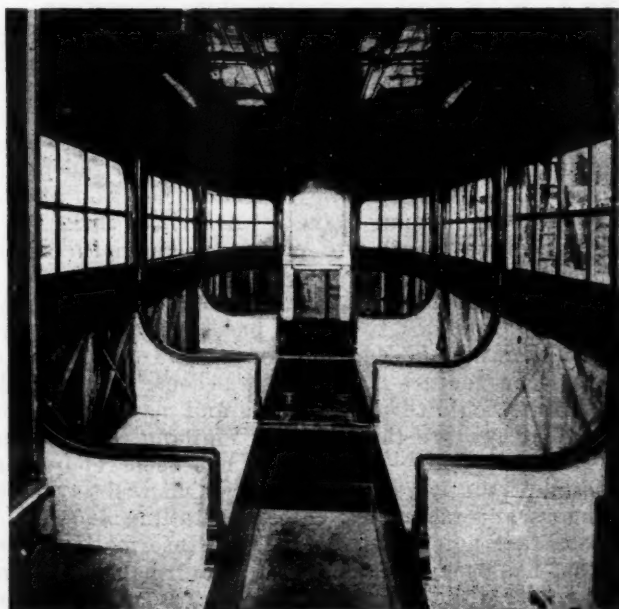
The knowledge and science of wing part construction has, of course, grown more thorough during the post-war period. The resultants of more rigid streamlining, to mention one obvious but important factor, are better known and its principles are being more intelligently applied than during the rush construction of the war. But, after all, the efforts of the designers have not been applied primarily to such studies—in the main, the more

necessary and valuable lessons of the last few months have concerned the power "heart" of the machine.

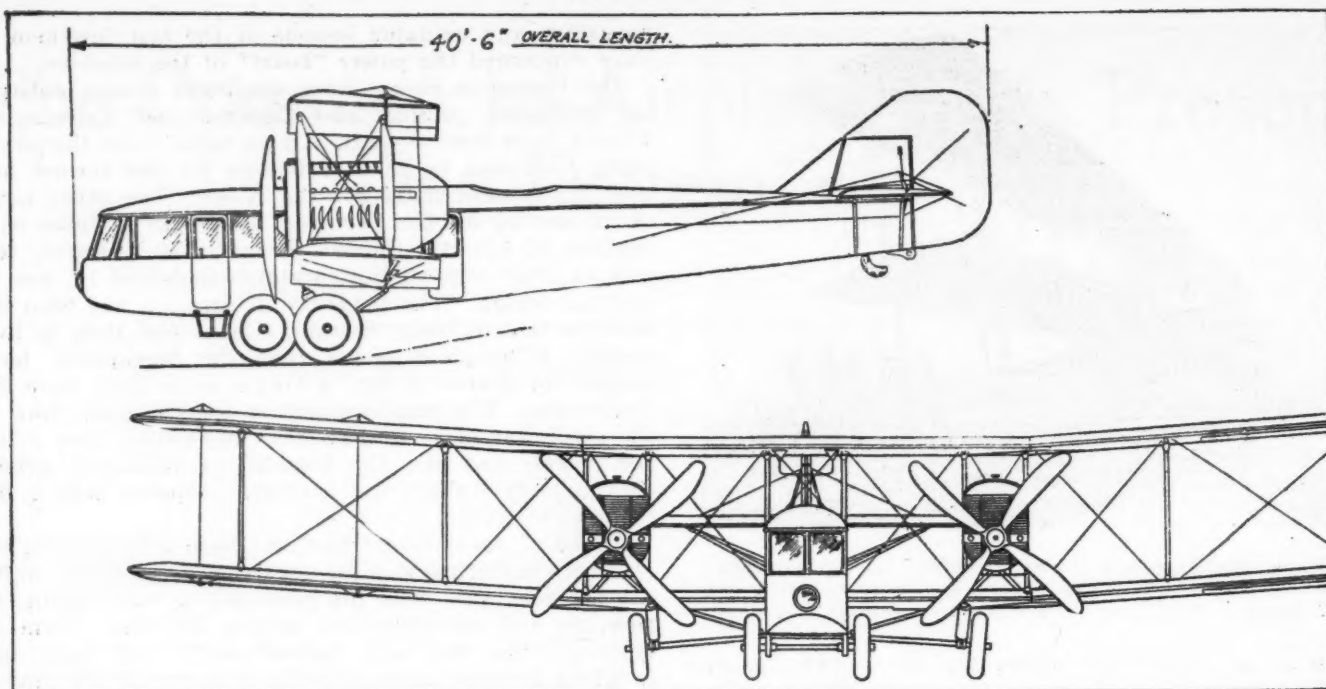
The transport planes have employed almost entirely the stationary engine, and Caudron and Farman, in France, have been alone in using a radial type, the power being furnished by three Salmsons for the former and two of the same make for the latter. The other large ships, leaving out the Germans, have been powered with engines of Liberty, Curtiss, Hispano, Rolls-Royce, Napier or Fiat construction, water-cooled, and of Vee or vertical design. The tendency in America has been the same as that of Great Britain, France and Italy in that respect, although it seems that the Europeans have sought for higher power in single units than have the Americans. This was revealed at the Paris air show in the exhibition of several sixteen- and twenty-four cylinder models and one, the Bugatti quadri-engine group, drove a single shaft and a single propeller with a 32-cylinder mounting.

A line of development that has been followed out extensively in Germany is the construction of large, multi-engined machines with the powerplants enclosed in the fuselage and the propellers driven by some form of gearing. This has been worked out in two ways—one in which a single large propeller is driven by the engine group and the second having several propellers distributed between the wings. Several giant machines mounting four engines and a single propeller have been built by Linke-Hoffmann of Breslau. The Deutsche Flugzeug Werke has constructed a number of models with four engines enclosed in the fuselage, driving four propellers through a series of gears and drive shafts. At least six machines of Siemens Schuckert design have each carried six 300-hp. Maybach engines driving four propellers through gears and shafts.

In the United States, five designers have come out with large transport machines for civilian use—Curtiss, with the ten-passenger Eagle; L. W. F., with its ten-ton Owl; Martin, with a twelve-passenger model; Thomas-Morse, with a mail ship of interesting design, and Lawson with the twenty-six-passenger transport. The Eagle mounts two C-12 Vee-type engines in nacelles on either side of the fuselage. Thomas-Morse is powered with two 300-hp. Vee-type Wright-Hispanos, one as a pusher and one a tractor in the center nacelle. The L. W. F.



*Passenger compartment of the Caproni triplane*



Plan views of the proposed Grahame-White nine-seater limousine. These plans were taken from "Flight," published in England

Owl has three tractor 400-hp. Liberties. Martin and Lawson each fit two Liberty engines in practically the same manner as the Eagle.

That covers the American planes of large commercial possibilities. The Eagle formerly fitted three six-cylinder engines of Curtiss design, but that was changed for the present two-engine mounting, the result being a more powerful and steadier ship. Of the American machines, Thomas-Morse probably is the more distinctive, as the front and rear engine mountings, the two side fuselages containing the pilot seats and supporting the tail group, are not duplicated. Its two-wheeled landing gear is unusual in the size of the wheels, but otherwise it is largely conventional. The Curtiss, Lawson and Martin passenger bodies are not unusual, the construction differing only in details from that of numerous European makers.

The L. W. F. Owl is another story altogether. It mounts three Liberty engines in the center nacelle and two outer fuselages, the two latter parts comprising most of the cargo space and supporting the tail groups. Its six-wheel landing gear, considering also the shock-absorbers, is of an unusual design, and the tire sizes are at least of astonishing dimensions. It is understood that this machine will begin its test flights soon and, as the largest commercial plane of American make, it is to be hoped that these will prove as successful as the venture is interesting.

British construction has been much like that of America, although at least two huge passenger ships are reported under way in England that would dwarf any of the American ventures. They have become known in the United States only through rumors and may not develop at all. The two are the Vickers "Vigilant" biplane and the Tarrant triplane. The former has been reported as a prodigy of the Royal Air Force, which will carry 100 passengers and mount six engines totalling 4000-hp., a figure or fact not impossible. Little information other than that has been received about it and that concerning the Tarrant, while no more authentic, is at least a bit more detailed. It is to carry 100 passengers, like the Vigilant, fit six Napier Lion engines with a total horse-

power of 3000, and have a wing surface of 5000 sq. ft.

The Vickers-Vimy-Rolls, which made such records in the African and the Australian flights, are well known. They carry fifteen passengers or equivalent freight, have a center passenger cabin, and the two engines, which total 760 hp., are placed, like the Curtiss or Lawson, in side mountings. The landing gear consists of four wheels under the engines, with a fifth wheel under the forward part of the fuselage nose. One other unusual feature is the four-bladed propeller.

The British Handley-Page likewise is a double-engined tractor and does not depart far from the general plan of the Vickers. It would be considered at least as a similar type, although its passenger compartment shape is different and the controls are situated in a forward cockpit. The new Airco 18, which the Aircraft Manufacturing Co. has projected for its Continental service from London, is a nine-passenger machine, mounting only one 450-hp. Napier engine, as a tractor, and having only two landing wheels. It attempts a load capacity that most other makers carry with at least two power units and for that reason is unusual.

Another British machine of rather novel design is the proposed Grahame-White E-8 nine-seater, which mounts two 320-hp. Rolls-Royce, Eagle V engines. Like other British or American machines, the engines are mounted to the right and left of the center cabin. The distinctive features, according to reviews in the British aircraft journals, comprise the cabin and the landing gears. The former, which is roomy and well-fitted, extends almost 10 ft. ahead of the wings and projects well under the lower surface, but the pilot's cockpit is placed behind the trailing edge of the wings. The four landing wheels are slightly staggered, the forward pair being placed under the cabin and the remaining two are to the right and left of the fuselage, one under each engine. This machine is much like the old Grahame-White four-seater and is a high-priced ship, with elaborate fittings and finish.

Taking up the French designs, probably the most interesting is the mammoth Bleriot, seating twenty-eight persons, two more than the American Lawson. The



Bleriot has crashed twice, however, and its future is not assured. It mounts four Hispano engines, each of 300 hp., two to the right and two to the left of the center cabin and cockpit. Each engine has its individual mounting, two in the upper wing and two in the lower, on either side of the cabin. They are controlled from a forward cockpit. Eight wheels are used for the landing gear, in right and left sets of four each. The machine has the additional feature of counterbalancing the ailerons by small planes in front of the leading edge. Illustrations of it in connection with other planes, was shown on page 471 of the Feb. 12 issue of AUTOMOTIVE INDUSTRIES.

Breguet, in a machine of much smaller capacity, has incorporated a steel cabin, although other features are not unusual. Caudron, in the large biplane that is designed for thirty passengers, mounts three Salmson radial engines, in much the same manner as the L. W. F. in America. Farman mounts two Salmson radial engines in a twelve-passenger ship having a span of 92 ft.

Caproni has been the chief designer of large planes in Italy and reference has been made to his efforts. It might be added that Caproni, in his recent visit to America, predicted that airplanes would continue to grow larger and that the factors of size limitations had not been reached or even approached. He has brought out several machines with a passenger capacity of ten or more, the larger ones being triplanes, and principally mounting tractor engines. One Italian plane has been pictured in this country showing a mounting of two pusher engines in addition to the two in advance, each engine having a separate mounting, the tractors being mounted right and left of the double-decked fuselage, with the pushers still farther from the cabin. The four mountings are built into the middle of the three wings and the plane was said to have a capacity of forty persons. Some of Caproni's machines have carried landing gears of four dual wheels and some of eight. He also has designed ships in which the tail group was supported by two fuselages, as the L. W. F. Owl, and some with a single support.

Another interesting Italian design, although not so large, is the Ricci biplane flying boat. It mounts three

Isotta-Fraschini, 200-hp. engines, two being pushers mounted in nacelles on either side of the center and the third being a tractor mounted in the nose of the central nacelle. Another Ricci plane, because of its contrast, should be mentioned here. It is a sport triplane, mounting a 40-hp. Anzani engine, and having a wing spread of no more than 10 ft. 4 in. and a landing speed of 24 m.p.h.

No mention has been made of the huge American plane the Gallaudet company has projected for the transpacific flight. It is designed to carry nine Liberty engines, operating in units of three, with a single propeller for each unit. Only newspaper announcements of this development have been forthcoming and, consequently, it cannot be considered other than a possibility, albeit a most interesting one.

The most important of the German commercial planes probably is the twenty-two-passenger Aviatik, photographs and a partial description of which appeared in AUTOMOTIVE INDUSTRIES of April 15. Also a biplane, it has two tractor and two pusher engines, mounted like the Italian machine mentioned before, but differing in that the rear power units develop 550 hp. each and those in front 220 hp. each. It has forward landing wheels, somewhat similar to the Vickers-Vimy.

Other designs and other machines have been projected in the various countries under review but these may be said to comprise the most promising. What they mean to the future of aviation, thinking of it as an industry that must stand or fall because of its own ability, is simply that much of the pioneer and experimental work has been completed. With these machines as a basis, aviation should be able to stand on its own feet, admitting that the problem of aerial transport has not been finally solved but that a secure foundation has been built from which present and future business may spring.

It well may be that more economical planes, possessing higher safety factors and with engines having greater lengths of life, will be built; that is to be expected. But enough certainly has been done to show that the industry has come out of its infancy and is ready to take a place in the commercial world.

## Woods for Airplane Construction

**A**IRPLANES have been so short-lived that it has mattered little whether the wood in them was resistant to decay. Now, with better construction and less accidental breakage of airplane parts, instances are coming to the attention of the Forest Products Laboratory of parts needing replacement because of decay.

The fact is being recognized that many woods in common use for airplanes are not resistant to decay and may be destroyed very rapidly when exposed to unfavorable weather conditions. Fortunately, according to the Laboratory, there are woods whose value in aircraft has been demonstrated which are highly durable. Among these perhaps the most notable is Port Orford cedar. Two others which in tests made by the laboratory have proved very resistant to decay are southern cypress and California redwood. Douglas fir, white oak, and black walnut stand fairly high in durability.

Mahogany and Spanish cedar are reputed to be very durable, but no tests have been made on them in the United States. Spruce, which has been the favorite wood for aircraft is, unfortunately, appreciably less durable

than any of the species mentioned. Likewise basswood, beech, birch, and maple may be classed with the less durable species.

The sapwood of practically all species decays readily. Hence in selecting wood for durability, only the heartwood should be accepted.

In cases where it is not practicable to use a naturally durable wood, the life of the wood part may be prolonged by giving it a preservative treatment. Sodium fluorid is a preservative which may be successfully used on parts that are to be glued. Coal-tar creosote, where its color and odor would not be objectionable, may be used for parts that are not to be glued. Decay in struts, propellers and some other large members can be prevented by applying a coating of aluminum leaf. This keeps the wood dry and dry wood does not decay.

**A**CCORDING to estimates prepared by the president of the American Car & Foundry Co., New York, railroads of the United States will need 849,500 cars during the next three years.

# Effects of Water Outlet Temperature on Engine Output

The Air Service Engineering Division at McCook Field undertook a series of tests with the Liberty engine to determine the optimum water temperature. The problems involved are of unusual interest to the automotive industry. The article has just been released for publication.

**E**NGINEERS are well aware of the fact that there is an optimum water outlet temperature for internal combustion engines. Experiments carried out at McCook Field for the Engineering Division of the Air Service on the Liberty engine showed that a water outlet temperature of 170 deg. Fahr. is best for this power-plant. In addition to producing power equal to that obtained with any other temperature, and a slightly better fuel economy, it has the advantage of being more easily maintained under flying conditions. A water flow of 75 to 80 gal. per min. will produce the desired temperature

range of 18 deg. to 20 deg. Fahr. These conclusions are based on experiments in which one full-power run and one power run with propeller loading were made with each of the following water outlet temperatures: 110, 130, 150, 170 and 190 deg. Fahr.

On completing these runs, the standard water pump was replaced by an externally driven water pump of greater capacity. The engine was then run at the normal speed of 1700 r.p.m., with the water outlet temperature of 170 deg. Fahr. The water delivery was controlled to give a temperature rise of outlet over inlet water of 16, 18, 20, 24 and 28 deg. Fahr. At each temperature range, the flow in gallons per minute was determined on the basis of a delivery of 500 lb. into a weighing tank.

The Liberty engine used was a U. S. army standard 12-cylinder type coupled to an electric cradle dynamometer. The outlet water pipe from the engine was provided with a three-way valve, which permitted the water to be shunted into a large tank mounted on scales. The auxiliary water pump assembly operated on the centrifugal principle, a Mercedes type impeller being used, in connection with a standard Liberty pump housing. The water was admitted at the center of the housing and expelled through two outlets tangent to the impeller periphery. The auxiliary pump was driven independently of the engine by a small electric motor whose speed was controlled by a rheostat.

Results of these tests are given in the curves shown herewith. Fig. 1 shows the brake M. E. P. and brake horsepower corrected to sea level and actual fuel consumption for full throttle and propeller load operation. Fig. 2 shows the fuel consumption for different water outlet temperatures for full throttle operation. Fig. 3 shows the fuel consumption for different water outlet temperatures for propeller load operation, and Fig. 4 the water outlet temperatures compared with power output at 170 deg. Fahr. water outlet temperature on a percentage basis under operating conditions compared with the temperature range between the inlet and outlet cooling water.

In considering the results of these tests, it should be borne in mind that on the Liberty 12-cylinder engine the outlet water from the cylinder jackets is led through jackets on top of the inlet manifolds for the purpose of heating the mixture and improving vaporization. In these tests no attempt was made to separate these two functions of the cooling system, and the results, therefore, represent the effect of simultaneous changes in the temperatures of the cylinder and intake manifold jackets.

The effect of varying water outlet temperatures on power output appears to be less marked than might be

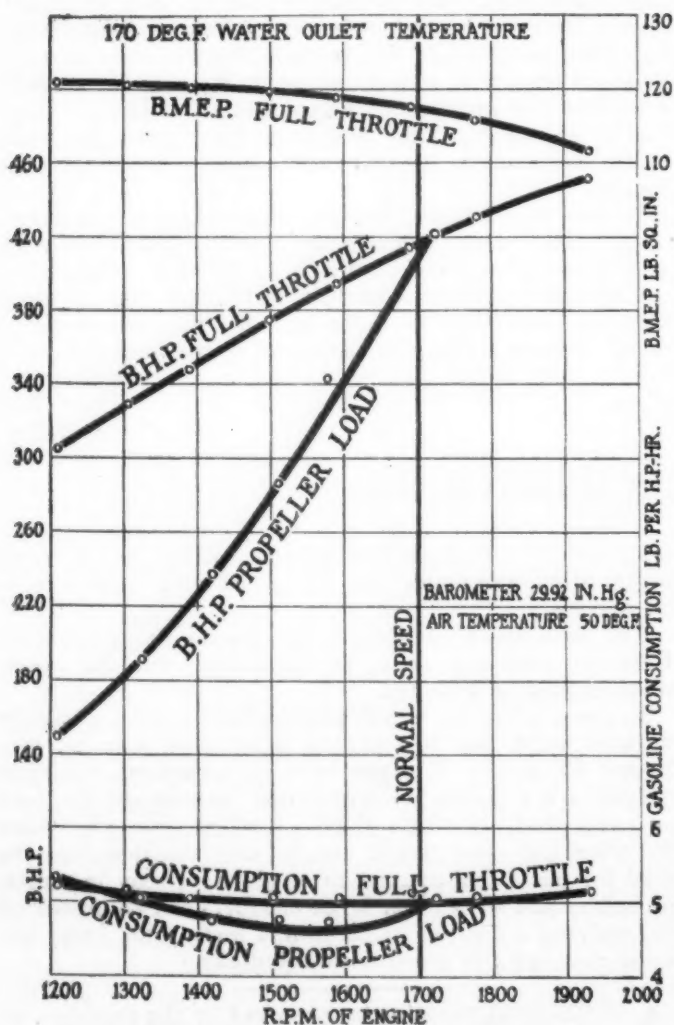
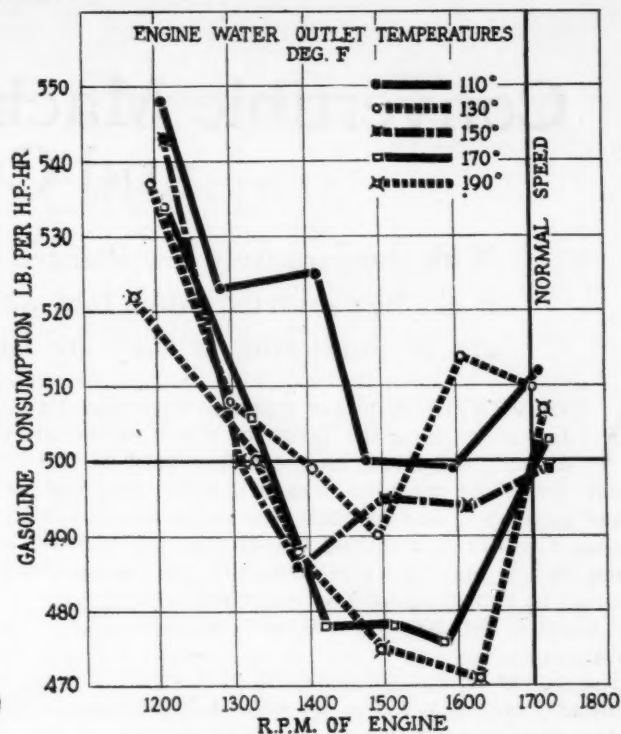
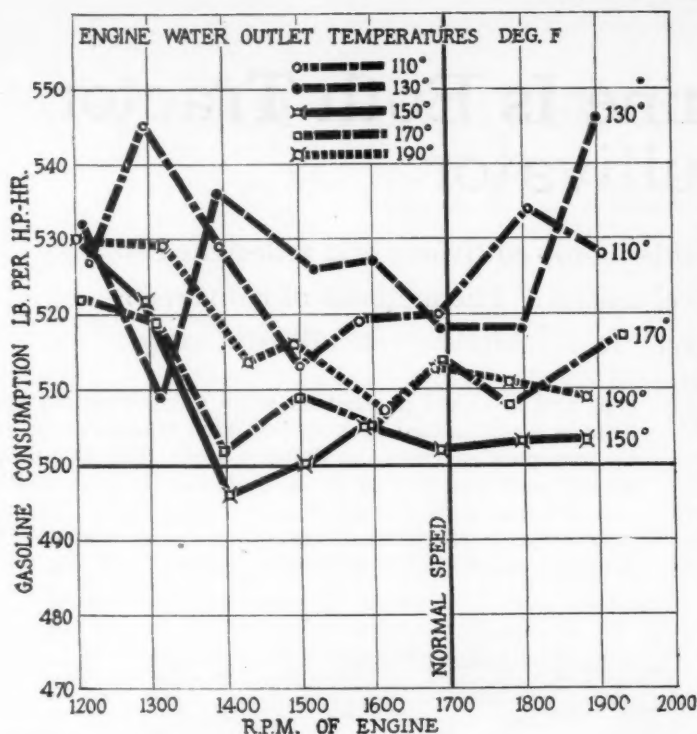


Fig. 1—Brake M. E. P. and brake horsepower corrected to sea level, and actual fuel consumption for full throttle and propeller load operation at 170 deg. Fahr. water outlet temperature



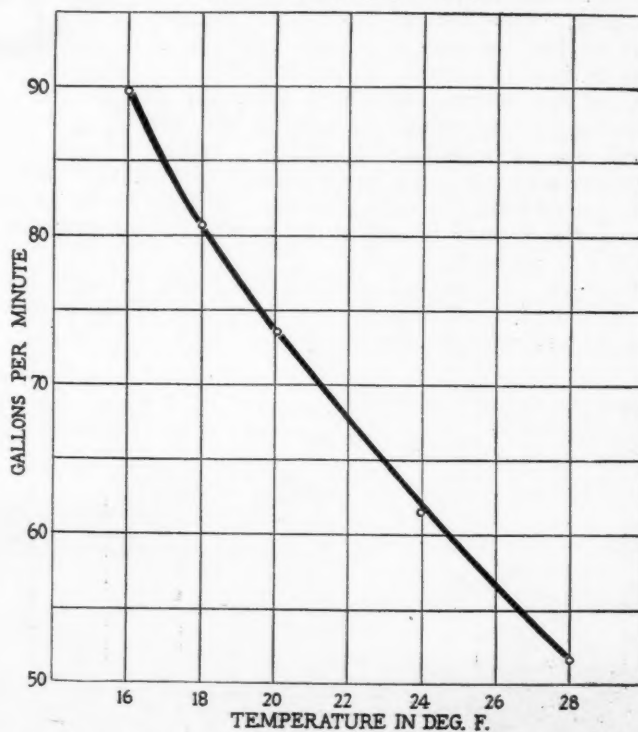
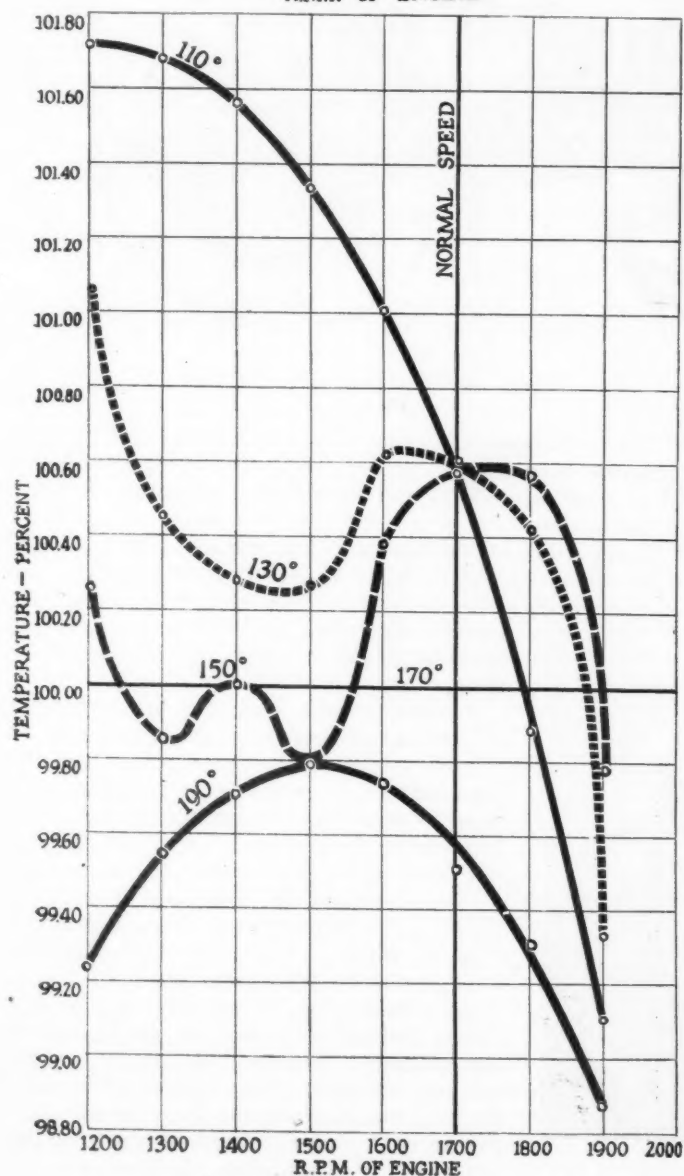


(To the left) Fig. 2—Fuel consumption at varying water outlet temperatures at full throttle operation, in pounds per brake horsepower-hour

(Above) Fig. 3—Fuel consumption with varying water outlet temperatures, for propeller load operation, in pounds per horsepower-hour

expected. The magnitudes by which the power outputs on this test differed with varying jacket temperatures were very small and to a great extent within the limits of

(Continued on page 1008)



(To the left) Fig. 4—Sea level power output of Liberty "twelve" engine with varying water outlet temperatures, compared with power output at 170 deg. Fahr. water outlet temperature on a percentage basis

(Above) Fig. 5—Temperature range of cooling water plotted against water flow through the Liberty 12-cylinder engine under operating conditions

## Convertible Machine Is Both Tractor and Cultivator

With comparatively few changes, this motor cultivator was redesigned so it can be converted into a four-wheel tractor. The methods of conversion are as interesting as they are easy. It is suitable for all row crops.

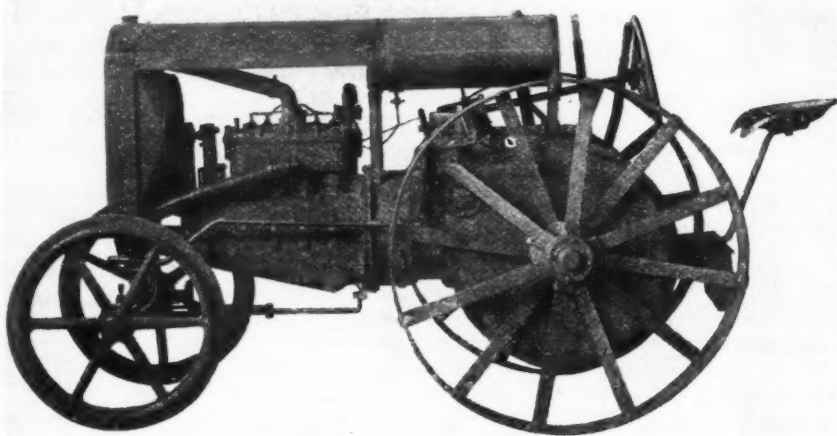
**A** CONVERTIBLE power machine that may be used for all work on the farm for which horses are ordinarily employed, has been developed by the Toro Motor Co. The machine was originally designed as a motor cultivator, and as such was exhibited at the 1919 Kansas City Tractor Show, but during the year it was found that by making a few comparatively simple changes it could be converted into a four-wheel tractor adapted for plowing and similar farm work.

The power equipment consists of a four cylinder Leroi  $3\frac{1}{8} \times 4\frac{1}{2}$  in. engine which in the cultivator overhangs the axles on the driving wheels. A double band clutch of Toro design is fitted and the transmission is of the two speed forward and reverse type and equipped with ball and Hyatt roller bearings throughout. The power plant accessories include a Kingston carbureter, Eisemann high tension magneto, Automotive Parts fan, and B & W radiator. Gasoline is used as fuel and is carried in an oval section tank, located over the transmission housing. This has a capacity of 11 gal. One of the reasons for using gasoline as fuel is that it permits better throttle control of the engine, which is essential in plowing corn as, when the corn is low, the speed has to be reduced to about 1 m.p.h., whereas high corn can be cultivated as fast as 3 m.p.h.

The gear reductions are such that at 1200 r.p.m. of the engine the tractor moves at 2.5 m.p.h. on low gear and 3.6 m.p.h. on high.

The drive is through a differential and through universal joints located concentric with the steering pivot axis, to both wheels. The small rear wheel is of the castor

type and is locked in position when going straight ahead. This is accomplished by a spring latch which can be readily manipulated from the driver's seat. The two driving wheels each measure 42 in. in diameter by 6 in. width of rim and can be fitted with 3 in. extension rims. The small rear wheel is 26 in. in diameter by  $4\frac{1}{2}$  in. width of rim. Without supplies, the cultivator weighs 2400 lbs.



*Toro two-plow tractor*

The cultivator is made in three widths, suiting it to different row crops. The three widths—center to center of wheels—are 60, 74 and 88 in. The wheelbase is 98 in. in all models.

Eight kinds of cultivator equipment have been worked out, including cultivators for corn, cotton, beans and sugar beets. In addition to the tools furnished, the farmer can add a grain drill, a single disk harrow, a grass mower, binder and hay tools.

To convert the cultivator into a tractor, a certain number of extra parts are required, including the front truck, two side plates and a rear platform. The steering gear is semi-inclosed and is of the worm and sector type mounted on ball bearings and provided with means for adjustment. The tractor is of the frameless or backbone type and is unusually compact. It has a turning radius of 105 in. The weight of the tractor is approximately 2300 lbs.

As a cultivator, the machine can be used for cultivating corn, etc., for seeding, planting, pulling a harrow disk, binder, mower, manure spreader, hay loader, etc. As a tractor, the machine can be used for plowing as well as for doing belt work including feed grinding, corn shelling, etc.



*Toro cultivator*



# An Analysis of Creeper Type Tractor Steering

Continuing his series of articles on tractors and tractor engineering, Mr. Norelius goes into a subject in which the existing literature is small. For that reason, if for no other, his careful consideration of the problem recommends itself to the designer and builder of such machines.

By E. F. Norelius

**I**N the development of automotive equipment requiring a differential action between the driving wheels, there have been invented a great many devices for balancing the load between the driving wheels and permitting relative motion between the wheels when making a turn or going over uneven ground. The different devices used may be divided under several headings and each separate device considered in relation to the rest of the machine.

The field is being searched continuously for new devices that will better accomplish the purposes. To stop the skidding of cars, to avoid differential action when it is not desired and to have it when it is desired, is the problem. However, this paper will consider only the standard types of differential and, more in detail, those devices requiring an absolute control of differential action because the vehicle is controlled by this means.

For this discussion, the various systems used will be divided as follows:

1. Standard or ordinary forms of differential.
  - (a) Bevel gear differential.
  - (b) Spur gear differential.
  - (c) Helical gear differential.
2. The foregoing forms with the use of brakes to assist in their action.
3. Separate control for either driver by means of clutches and brakes.
4. Separate control of speed for either driver by means of a positively controlled gear ratio to be used by the operator as desired.

Irrespective of whether automobiles, trucks, wheel tractors or track laying type of tractors are considered, it is understood that it requires some energy to overcome the turning resistance of the driving wheels on the ground. That is, no machine of the above types will roll as easily around a curve as it will straight ahead. The difference between the resistance encountered on a straight course and on a curve is by far greatest with the track laying type of vehicle.

The types included under the first heading are intended to balance the pull between the two driving wheels; any lack of balance is due to the slight amount of friction in the particular device, especially in the helical type of differential. However, assuming the drive to the two wheels to be balanced, then all resistance to turning must be taken care of by side thrust on the steering wheels.

In the second type, a brake is fitted on each side of the differential to decrease the speed or stop that side and increase or double the speed of the opposite side. This is accomplished in two different ways—first, by braking directly on the differential shaft, as in one model of Best

tracklayers, and, second, by braking one side of the differential through a planetary speed reducing gear, as on the Cletrac tractor.

In the first case, if one of the brake drums is stopped by a severe application of the brake, the driver on that side is stopped while the opposite driver is driven at twice its normal speed. In the second case, if the brake drum is stopped, the speed of the corresponding driver is reduced in a proportion depending upon the planetary gear ratio, while the speed of the opposite side is correspondingly increased.

There is a third system, which, however, cannot be classed as a differential, as it does not differentiate between the drivers, each driver being an independent unit with separate control by means of clutches. This type is exemplified in the Holt Caterpillar and some other makes of track-laying vehicles. These types also require a brake on each side to overcome the turning resistance of the drivers, especially those that are not equipped with front wheels.

The fourth type, as far as the writer knows, is not exemplified in any commercial vehicle of to-day. It consists of a positive drive to each driver but under control of the operator, so that the relative speeds of the two sides may be changed at will without disengaging and applying clutches. This type is particularly applicable to vehicles of the track-laying type without front steering wheels. A number of types along this line have been developed but have not been put into use.

The foregoing short discussion has been written to show more clearly the differences in application of different devices and to draw a line between what might be termed "self" differentiation and controlled differentiation. In the rest of this article, the turning of track-laying vehicles and controlled differentiation as exemplified under types 2, 3 and 4, are to be dealt with.

Fig. 1 represents a track-laying type of tractor and Fig. 2 that portion of the tracks of such a vehicle as comes in contact with the ground, together with the acting forces.

If a turn of any radius is attempted a resistance to a deviation from the straight course is met with which is dependent on the ground condition or coefficient of ground slippage of the tracks on the ground. In case of a right hand turn, this resistance may be represented by the small arrows. To determine the amount of this resistance, the method of uniform beam loading will be used. For any angular motion there is sliding motion in both the transverse and longitudinal directions. The transverse direction will be considered first.

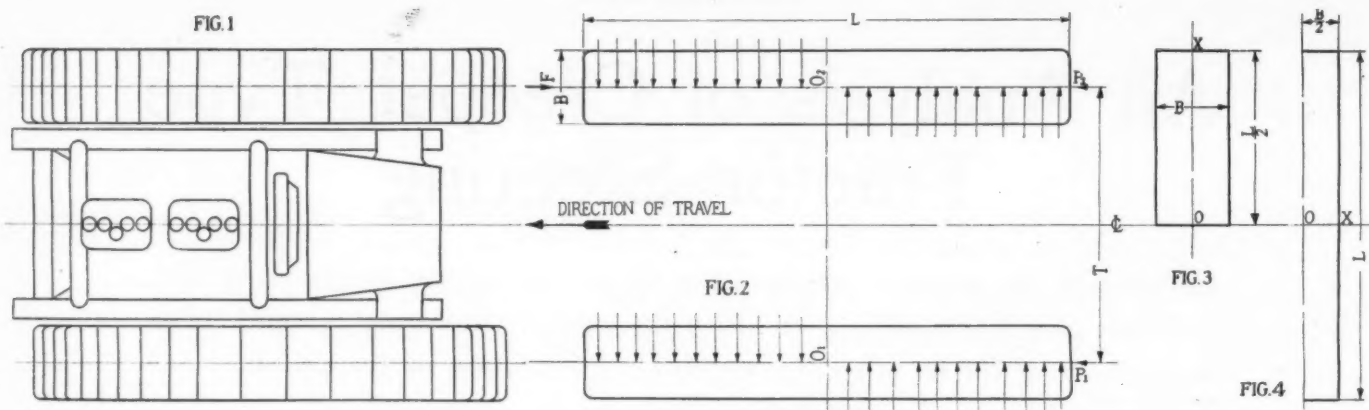


Fig. 3 represents one-half of the track on one side of the machine and that half which is at one side of the transverse center line of the machine.

Let  $U_2$  represent the value of the transverse ground slippage or failure, in pounds per unit of area of track contact.

$B$ , width of track.

$L$ , length of track in contact with the ground.

For transverse motion the line  $XO$  may be considered uniformly loaded, the total loading being  $U_2BL/2$ .

The moment of this loading on an arm of  $L/4$  length is  $U_2BL^2/8$ . Or, the total moment for both tracks is  $(4 \times U_2BL^2)/8 = U_2BL^2/2$ . Fig. 4 represents one-half of the track on one side of the machine and the portion which is at one side of the longitudinal centerline of that track.

By a like system of reasoning the total moment in a longitudinal direction equals  $(U_1B^2L)/2$ , where  $U_1$  represents value of longitudinal slippage or failure, in pounds per unit of area of track contact.

Let  $M$  represent the total resisting moment to turning of both tracks. Then

$$M = \frac{U_2BL^2}{2} + \frac{U_1B^2L}{2} \quad \dots\dots\dots (1)$$

Let  $f_1$  represent the coefficient of ground adhesion of the tracks in a transverse direction and  $f$  the corresponding coefficient in a longitudinal direction.

Then

$$U_2 = \frac{f_1W}{2BL}$$

and

$$U_1 = \frac{fW}{2BL},$$

where  $W$  represents the weight of the tractor.

The formula for the pull on the inside and the outside tracks can now be determined and, knowing values of  $U_2$  and  $U_1$  from tests, it is possible to determine the value of  $M$  which would correspond to the moment of the force exerted by the front wheel in the case of tractors equipped with front steering wheels.

Referring again to Fig. 2, the following designations will be used. Let  $F$  = rolling resistance of each track in pounds.

$T$  = tread of machine or centerline distance of tracks, in inches.

$P_1$  = pull applied to outer track, in pounds.

$P_2$  = pull applied to inner track, in pounds.

$M$  = resisting moment to turning, in inch-pounds.

Summing up the moments about  $O_2$ ,

$$\Sigma M_2 = P_1T + M - FT.$$

A right hand turn of the tractor is considered here, and the arrows in Fig. 2 are ground reactions in all cases.

Summing up moments about  $O_1$ ,

$$\Sigma M_1 = M - P_1T + FT$$

Each of these summations must equal zero in order that all forces may be in equilibrium—

$$P_1T + M - FT = 0$$

Solving for the pull on the inner track,

$$P_1 = \frac{FT - M}{T} \quad \dots\dots\dots (2)$$

and

$$M - P_1T + FT = 0;$$

or

$$P_1 = \frac{FT + M}{T} \quad \dots\dots\dots (3)$$

Check by solving for  $T$  and equating

$$\frac{M}{P_1 - F} = \frac{M}{F - P_2}$$

or

$$P_1 - F = F - P_2 \quad \text{and} \\ P_1 + P_2 = 2F$$

which shows there is no motion forward or back, or that all forces are equalized.

If  $R$  represents the rolling resistance of the tractor in per cent, then

$$F = \frac{RW}{2},$$

$W$  being the weight of the tractor.

From equation (1)

$$M = \frac{U_2BL^2}{2} + \frac{U_1B^2L}{2}$$

By test it has been found that  $U_1$  and  $U_2$  are about the same under all conditions, and  $W$ ,  $L$  and  $T$  are constant for any particular machine.

The only variables, therefore, are  $U_1$ ,  $U_2$ ,  $P_1$ ,  $P_2$  and  $F$ . But since  $U_1 = U_2$  we can plot curves between  $U_1$  and  $P_1$  with different values of  $F$ , also between  $U_1$  and  $P_2$  with different values of  $F$ . These curves are shown in Fig. 5 and it must be remembered that they show only track pull required for turning and do not include any drawbar pull. In case there is a drawbar pull  $P$ , the actual track pull becomes  $P/2 + P_1$  on the outside track and  $P/2 + P_2$  on the inside track. No brake will be required on the inside track, therefore, as soon as  $P/2$  is greater than  $P_2$ . In order to make clear the basis on which the accompanying curves are plotted, so as to include only variables, the equations for  $M$ ,  $P_1$  and  $P_2$  will be transformed.

$$M = \frac{U_1BL^2}{2} + \frac{U_1B^2L}{2}$$



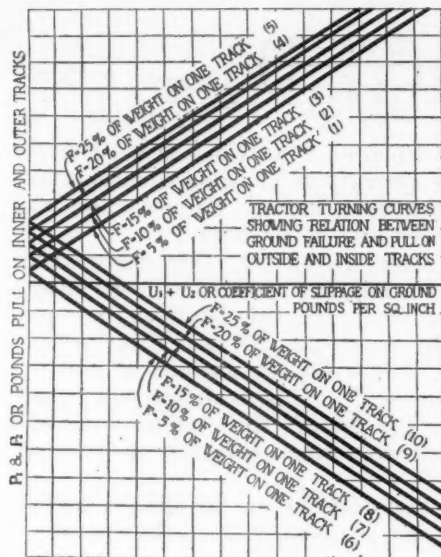


FIG. 5

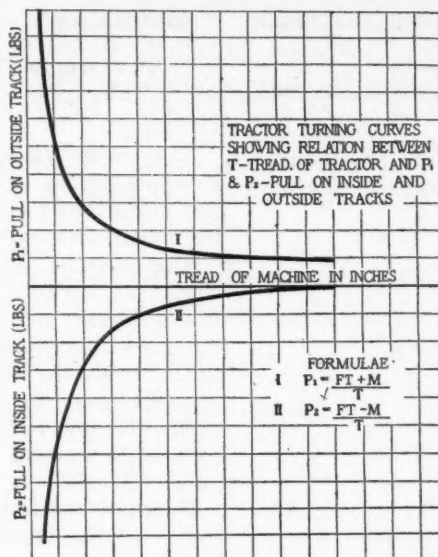


FIG. 6

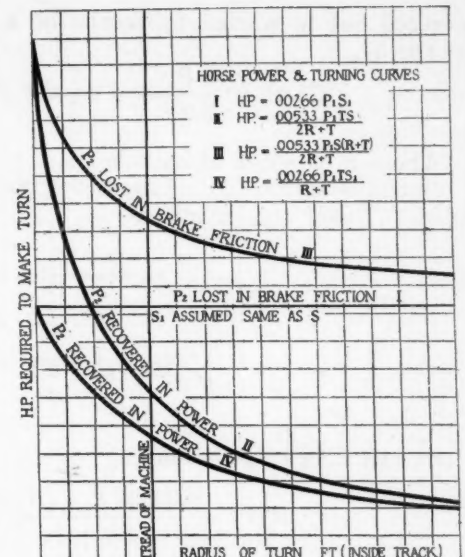


FIG. 7

But  $U_1 = U_2$ , therefore

$$M = U_1 \frac{(BL^2 + B^2L)}{2}$$

As  $\frac{BL^2 + B^2L}{2}$  is constant for any one machine, let it be represented by  $K_1$ .

Then

$$M = U_1 K_1$$

Also

$$P_1 = \frac{FT + M}{T}$$

And

$$P_2 = \frac{FT - M}{T}$$

Substituting the value of  $M$ —

$$P_1 = \frac{F + U_1 K_1}{T}$$

$$P_2 = \frac{F - U_1 K_1}{T}$$

But  $T$  is constant for any given machine, therefore let

$$K = \frac{K_1}{T}$$

$$\text{and } P_1 = F + U_1 K \quad \dots \dots \dots (4)$$

$$P_2 = F - U_1 K \quad \dots \dots \dots (5)$$

Work done in making any turn of  $\theta$  deg. equals:

$$P_1 [2\pi (R + T) - 2\pi R] \frac{\theta}{360}$$

disregarding internal loss of energy, and where  $R$  is the radius of the turn measured on the inside track, because  $P_1 + P_2 = 2F$  and

$$[2\pi (R + T) - 2\pi R] \frac{\theta}{360}$$

is the difference in distance forces  $P_1$  and  $P_2$  act.

Let  $E$  represent the work of turning in foot-pounds.

Then

$$E = \frac{2P_1 \pi T \theta}{360} = \frac{P_1 \pi T \theta}{180} \quad \dots \dots \dots (6)$$

The above is based on the condition that all power expended in negative pull  $P_2$  can be recovered.

From these considerations we may conclude that the proper kind of a steering device is one which has control of the gear ratios between one track and the other, so as to force the machine to turn, and one which has a free mechanical or electrical drive from one side to the other so that the negative pull,  $P_2$ , on the inside track will help the outside track.

In general it can be said that this condition holds when by rotating the drive wheel at one side of the machine, the drive wheel at the opposite side will be caused to rotate.

This energy may now be transformed into horsepower, but in so doing a certain type of machine must be considered. Type 2 will first be considered where a fixed speed is maintained at the center line of the machine and that part of type 2 where the brake wheel is locked and no loss is chargeable to brake slippage.

Let  $d$  be the distance traveled by the center line of the machine in making a turn of a radius  $R$ , measured on the inside track, in feet. Then

$$d = \frac{2\pi (R + 2) \theta}{360}$$

Let  $s$  = speed of machine at the center line, in miles per hour,  $t$  = time of turn, in minutes.

Then

$$t = \frac{\pi (R + 2) \theta}{180 \times 88s}$$

Or

$$H. P. = \frac{E}{t} \div 33,000 = \frac{P_1 \pi T \theta}{180} \div \frac{33,000 \pi (R + 2) \theta}{180 \times 88s}$$

Reducing,

$$H. P. = \frac{0.00533 P_1 T s}{2R + T} \quad \dots \dots \dots (7)$$

Considering the type of machine where  $P_2$  is not re-

covered but is wasted by means of a clutch and brake (Type 3),

$$H. P. = \frac{88 P_1 s_1}{33,000} = 0.00266 P_1 s_1 \dots\dots\dots (8)$$

Where  $S_1$  is speed of outside track in miles per hour.

But in equation (2)  $s$  is speed of the center of the machine. Under this condition

$$S_1 = \frac{R+T}{R + \frac{T}{2}}$$

$$S = \frac{2s(R+T)}{2R+T}$$

Substituting in equation (3)

$$H. P. = \frac{0.00533 P_1 s (R+T)}{2R+T} \dots\dots\dots (9)$$

There is another system of steering which, although it has not yet been reduced to a practical basis, has marked possibilities. In this system the speed of the inside track is reduced and that of the outer track remains the same; this being accomplished not by disengaging a clutch and applying a brake but by providing a different gear ratio for the inside track than for the outside, which may be put into action at will. With this arrangement less horse power will be required for turning than with any of the other devices, as no power is consumed by a brake, and the outside track does not speed up. As in the previous case, the work of turning and the horsepower may be studied in its relation to other functions.

This type is referred to as Type 4.

$$E = \frac{P_1 \pi T \theta}{180} \quad (\text{equation 6})$$

Let  $d_1$  = distance traveled by the outside track

$$d_1 = \frac{2\pi(R+T)\theta}{360} = \frac{\pi(R+T)\theta}{180}$$

$$t = \frac{d_1}{88s} = \frac{\pi(R+T)\theta}{180 \times 88s}$$

$$H. P. = \frac{E}{33000t} = \frac{\frac{P_1 \pi T \theta}{180}}{33000 \left( \frac{\pi(R+T)\theta}{180 \times 88s} \right)}$$

$$= \frac{88 P_1 T s_1}{33000 (R+T)} = \frac{0.00266 P_1 T s_1}{R+T} \dots\dots\dots (10)$$

Curves for equations (7), (8), (9) and (10) are plotted in Fig. 7 and show clearly the advantages of the different types of drive and their relations.

Assuming  $R = 0$ , then the above reduces to

$$H. P. = 0.0266 P_1 s_1$$

which is the same as the equation for the machine with clutch and brake, which is what would be expected.

With a machine equipped in this manner the speed of the center line of the machine is less than for the one equipped as assumed by equation (7). The relation between these speeds are the same as used in deriving equation (9)

$$s_1 = \frac{2s(R+T)}{2R+T}$$

Substituting

$$H. P. = 0.00266 P_1 T \left( \frac{2s(R+T)}{2R+T} \right) = \frac{0.00533 P_1 T s}{2R+T}$$

This is the same as equation (7), which is what would be expected, as in the derivations of these equations like considerations have been used, namely, no power loss and the same speed of center line of machine.

The question now arises as to how this energy consumed in turning a track-laying type of tractor affects the drawbar pull and what are the relations of these different functions. It can readily be seen that there is available at the track only a limited amount of pull dependent upon the value of  $U_1BL$ . This available pull equals  $U_1BL$ . If now  $U_1BL$  is less than  $P_1$ , then the machine will be unable to turn itself even when exerting no drawbar pull.

Further, assuming the drawbar to be applied at the center of the tractor, the available pull at that point

$$P = 2(U_1BL - P_1)$$

The pull on the inside track under this condition would be

$$P_2 = U_1BL - P_1$$

But as  $P_2$  is a negative quantity it can be seen that no actual pull will exist on the inside track until

$$P_2 = U_1BL - P_1$$

or till  $U_1BL$  is equal to the sum of  $P_2$  and  $P_1$ , both being taken as positive quantities.

From the foregoing it can be seen that what is required is a drawbar so arranged that it can be shifted from the center of the machine toward the inside track when it is desired to make a turn. It is a question how this can be done, but the reasoning shows the fallacy of fastening the drawbar rigidly at the back of the frame and that pivoting it approximately at the center of the machine is of great advantage.

## Effects of Water Outlet Temperature on Engine Output

(Continued from page 1003)

experimental error. In theory, a lower jacket temperature should increase the density of the charge with consequent increase in power. This action, however, is minimized by the short-time interval through which jacket heat can act on the incoming gas. Similarly, the loss in charge density with higher jacket temperatures is offset largely by the improved vaporization due to the higher intake manifold temperatures.

Reference to the curves of percentage differences in power output against speed, Fig. 4, bears this out. It would seem that a critical point exists at 1700 r.p.m., below which the effect on density is most noticeable, and above which point the effect on vaporization is the dominant factor. The tendency for power output to increase with decreasing water temperatures below 1700 r.p.m. can be definitely identified. On the other hand, there is a contrary tendency for specific fuel consumption to decrease with increased jacket temperatures.

A general balance between the opposing factors seems to exist at a water jacket temperature of 170 deg. Fahr. under these conditions. The fuel consumption and power output are as good as any obtained at other water temperatures, allowing for limits of experimental error.

As regards temperature range between inlet and outlet water, the curve in Fig. 5 reveals it to be practically proportional to the water flow; that is, the quantity of heat rejected to the jackets is nearly constant irrespective of the flow. A water flow of 75 to 80 gal. per min. creates a temperature range of 18 to 20 deg. Fahr.



# New French Kerosene Engine Has Single Sleeve Valves

In the Caffort kerosene engine, a single sleeve is driven by an eccentric off a half time shaft in the base chamber. Before intake, a partial vacuum is formed with all valves closed, and then the fuel is injected in a pulverized condition by means of a special pump.

By W. F. Bradley

**I**N June, 1918, the Automobile Club of France organized a competition for automobiles running exclusively on kerosene. The first and the second prizes were won by Unic cars having engines modified to the Bellem and Bregeras system. These were the only cars which went right through the trials and fulfilled all requirements.

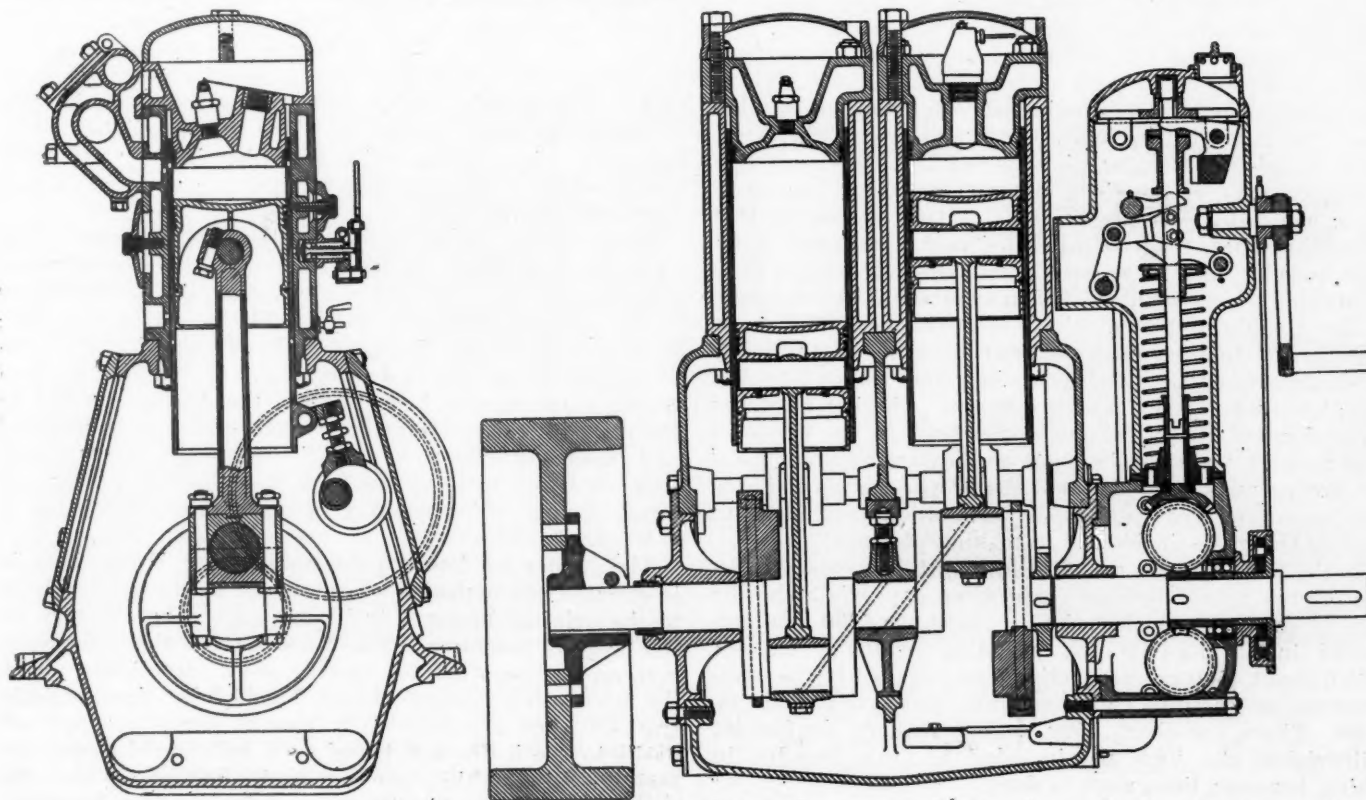
These engines were of quite normal construction and originally had been similar in every respect to other Unic power plants but had been modified by fitting a special camshaft and adding the pump and pulverizer necessary for the Bellem and Bregeras system of using kerosene. It is obvious that better results could have been obtained if the engine had been specially designed for using kerosene according to the Bellem and Bregeras system, and now engines on these lines have been built by the Caffort company of Paris.

The Caffort engines are all stationary types. They are built with one, two or four cylinders, and have a bore and stroke of 4.3 x 6.2 in. These engines have a

single sleeve driven by an eccentric off a half time shaft in the base chamber. The sleeve makes two strokes to four strokes of the piston. The cycle is not the same as on the standard gasoline engine. On the first, or intake stroke, the piston moves down while all ports are closed, and a partial vacuum is formed in the cylinder. About 45 deg. before lower dead center, fuel is injected into the cylinder, by means of a special pump and a small automatic valve in the cylinder head. This injection of fuel into a partial vacuum causes very fine pulverization and makes it possible to start up on kerosene from cold. Pure air is admitted during the rest of the intake stroke, and the mixture is compressed, fired, and exhausted in the ordinary way.

With this cycle the single sleeve is considered more advantageous than poppet valves. Gasoline is fed into the cylinders, when the partial vacuum has been formed, by means of a variable stroke piston pump.

The horsepower obtained from the 4-cylinder engine is 23 at 600, 25 at 700, and 30 at 800 r.p.m.



Sections through the Caffort single sleeve kerosene engine

# Production Processes for the Straight Run Automotive Foundry

As the supply of gray iron castings has been called the barometer of the industry, production efforts of to-day may be realized or defeated in the foundry department. This article was written with that thought in mind and it is, consequently, deserving of study and consideration.

By J. Edward Schipper

IT has been said with more or less truth that the supply of gray iron castings is the barometer of the automotive industry. This statement becomes more apparently true than ever when it is remembered that, of the labor disturbances in the industry during the past year, the most persistent have been in the foundries. This is no doubt due to the fact that a great many foundries are constructed and operated in such a manner as to make conditions very unpleasant for the men who work in them.

More manual labor and more disadvantageous conditions as regards health have existed in foundries than in practically any other phase of automotive manufacture, and it is only recently that conditions have begun to substantially improve. Here and there manufacturers have realized the fact that it would be difficult to hold men in the foundries unless conditions in foundry work were brought up to the level of other phases of manufacture. This is more true now, when there is a demand for good men in all branches of industry, than it was a few years ago when an actual unemployment situation existed.

At present there is a movement in the foundry fields to change conditions, so the men may work in pure air and have the advantages of mechanical contrivances to eliminate the heavy lifting and other manual work which was once considered necessary in this field.

The foundry of the Ford Motor Car Co. has been used as a model by several companies. One reason is that efforts have been made to introduce mechanical aids wherever possible and to remove the unpleasant atmospheric conditions which would exist if precautions were not taken.

The results of this care have been that the labor turnover in the foundry is lower than in some of the other Ford departments, in spite of the situation as it exists elsewhere, where the foundry turnover is higher than any other department. It simply comes back to the situation that foundry work can be made as pleasant as other manufacturing work, provided that the proper mechanical aids are introduced and the proper installations are made to remove the gases incidental to making castings.

In the Ford foundry department, which is a separate section of the manufacturing institution, approximately 900 tons of castings are made daily. There are 6000 men employed in all departments, including drafting, etc., of which about 4500 are production men engaged in the manufacture of castings, both straight production and job work. There are about 1500 pattern makers, draftsmen, millwrights, etc. This also includes the brass foundry, in which, however, little work is done.

In arranging the Ford foundry, the layout was designed

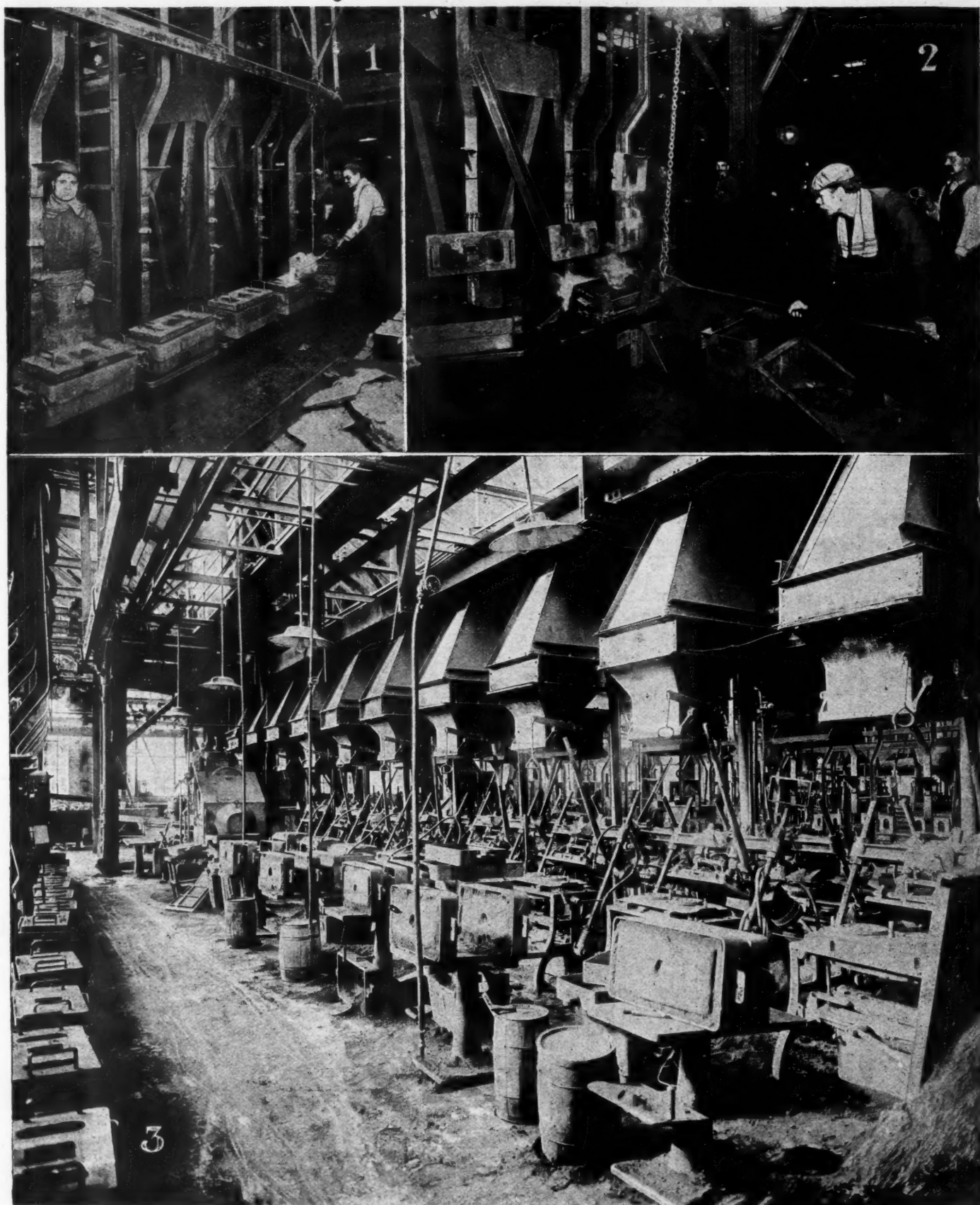
to provide the best possible working conditions and to make the greatest use of production methods for establishing a continuity of progress. The same continuous motion of parts from the raw state to the finished condition, which exists in the chain conveyor assembly system and in the chain manufacturing system is also found in the foundry. Here the castings are in motion even during their production, which is quite contrary to the usual practice of having the ladles of molten metal brought to the molds and having the molds around the floor in various states of disorder. A mechanical lifter and transporting apparatus, which in some cases is manual only to the extent of guidance, all of the weight being held by overhead apparatus, not only makes the work easier and more pleasant for the men but also increases the productive ability of the foundry.

The mechanical handling of the foundry work starts with the sand. This is delivered automatically by overhead conveyors to hoppers, so that sand can be secured by the molders by simply pulling a lever without bending their backs. The mold is delivered from the molding machine operator to a small table directly behind him, in the casting of the cylinder heads, for example, to a small table at which the cores are set in. Then they are lifted to the conveyor, where a man with the other half or cope side closes the flask, puts a weight on it, and sends it on its way along the conveyor.

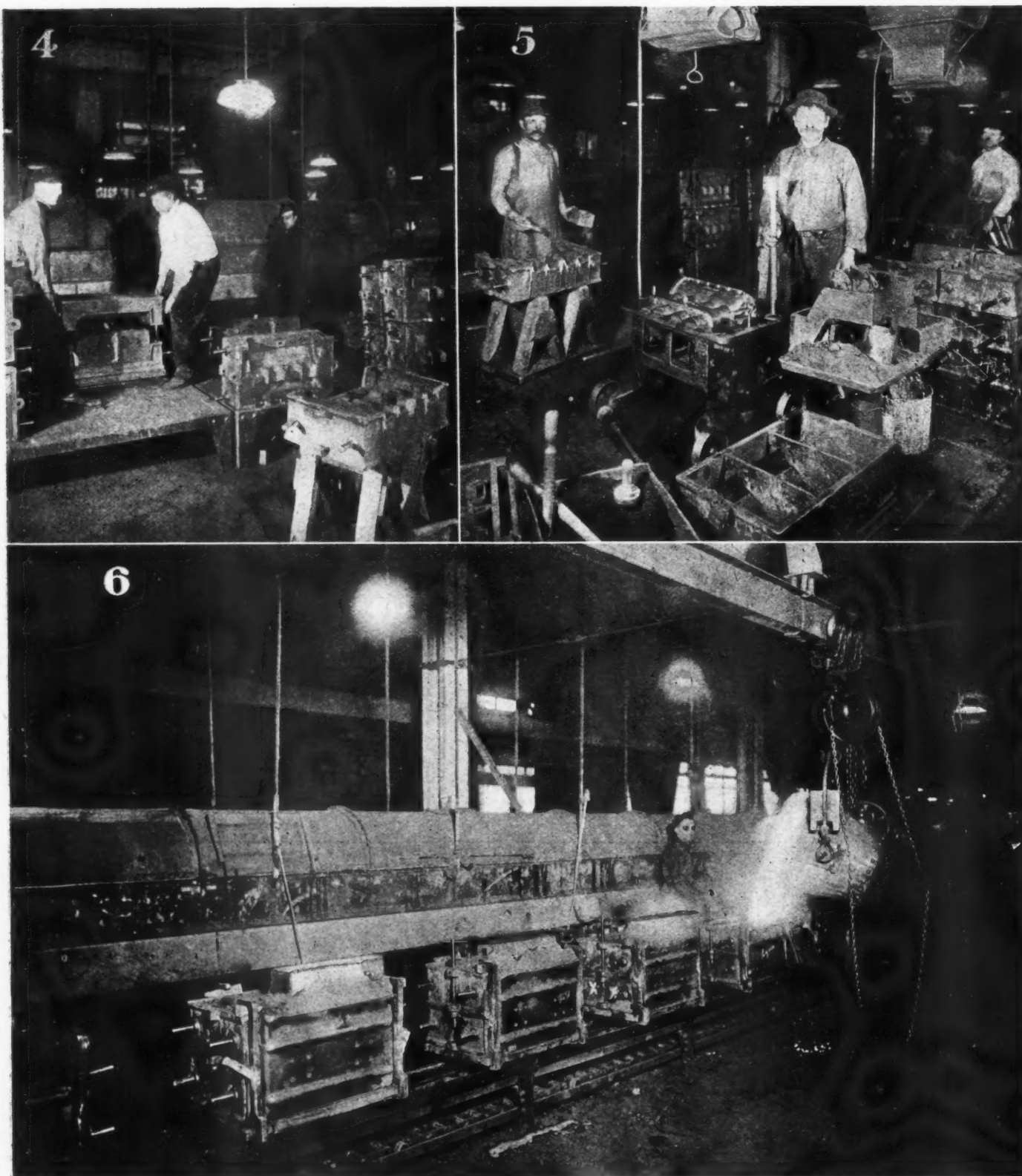
The metal is poured as soon as the flask is closed. The closed flask reaches the ladle man without manual transportation, as it is carried along a conveyor which moves on an overhead elliptical track. The speed of this conveyor is from 6 to 15 ft. per min., depending upon the sizes of the castings to be made and the desired production. After having been poured, the casting travels to the opposite side of the ellipse where the cope is removed and, a little further along in its progress, an overhead supported fork picks up the flask, removes the casting and drops it on a grid or grating upon which there is a heavy down draft of air.

The sand goes down to the floor below. From there it is elevated mechanically, screened, and then conveyed back to the original hoppers, to be used again by the men at the molding machines. There are nine of these conveyor systems in operation for casting work, practically all of the production castings being handled by these elliptic tracks. They are sufficiently long to carry a supply of flasks to the ladles and travel to a sufficient distance for cooling. Finally they are removed, shaken out and the empty flasks are sent back to the molding machine operator.





1—Conveyor in operation with flask closed and metal being poured. 2—Removing the mold after the casting has been made, with an overhead suspended fork. Shake-out grating is shown in the foreground. Sand passes through this to the floor below. 3—Row of molding machines showing the overhead hopper, the small tables upon which the flasks are placed ready for the cope section to be put on, and to be placed upon the conveyor

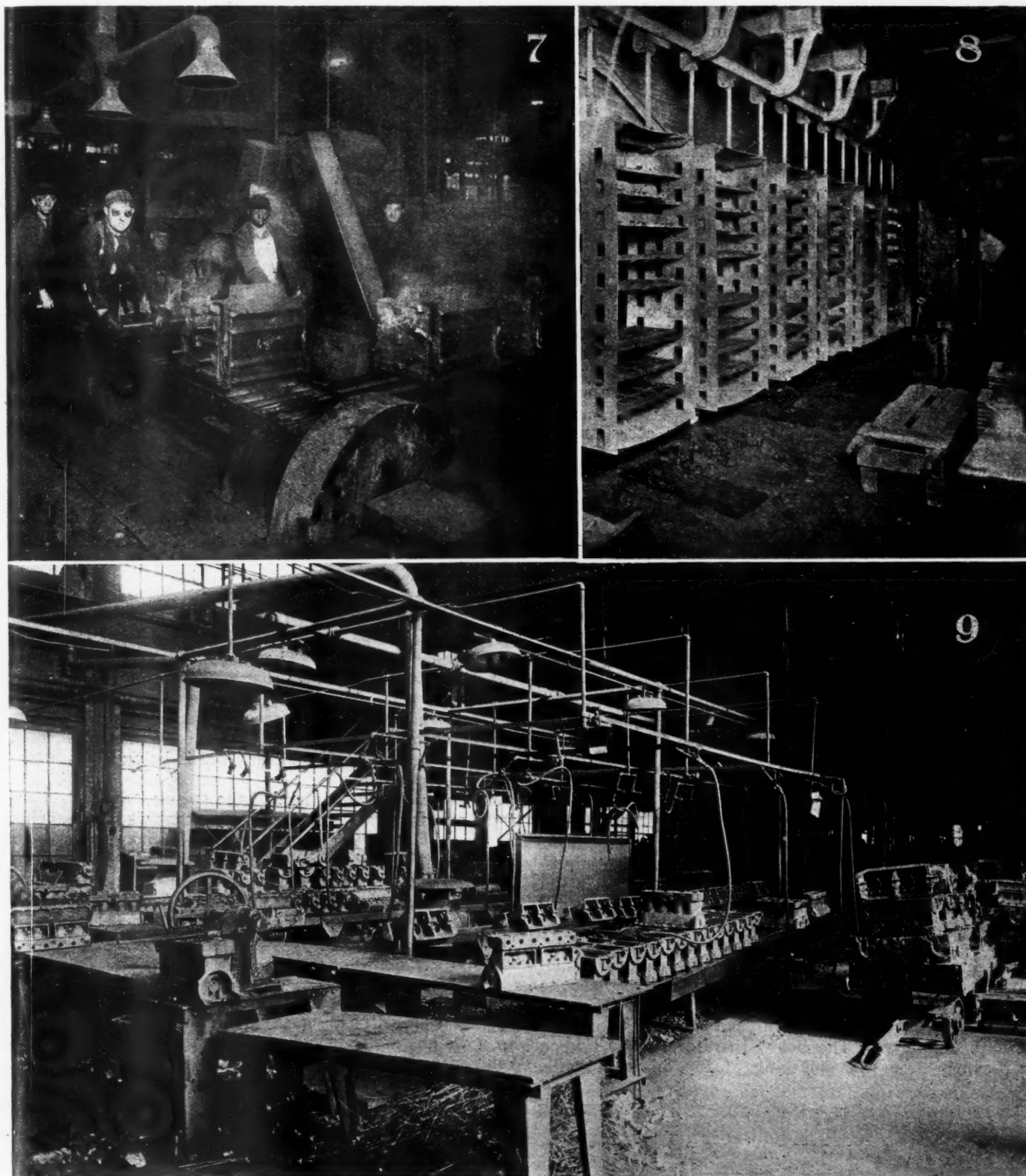


4—Cylinder block operation showing the core setting and closing before placing upon the chain conveyor. 5—Molding machines for the cylinder blocks. Note the overhead hoppers for sand and the levers which are pulled to feed it. 6—Cylinder block molds passing along conveyor and metal being poured from worm gear ladles

A special system is used for cylinder block manufacture. It is a chain conveyor system along the same idea as the overhead conveyor for the other castings but, as the cylinder blocks are heavier and more complicated and consequently smoke considerably after the gases are burnt from the sand, they pass under a long exhaust hood before being dropped on the shake-out grates.

This care with the smoke, which comes from the cylinder block castings, makes the air in the Ford foundry far purer than that found in the average shop. There are oils in the sand which release gases, due to the heat of the molten metal poured into the molds. These immediately ignite and while they are burning, are consumed to  $\text{CO}_2$ , which is, of course, an odorless, colorless gas, and,





7—Transferring the molds after the metal has been poured to the center conveyor which passes beneath the hood to draw off the gases which are emitted from the casting after the flame has gone out. 8—Continuous core oven. Note the rack on overhead carriers and the oven in the background into which the carriers pass. They are of such dimensions as to seal the oven, although entering it. Note how the roller conveyor enters through a slot in the brick at the top of the oven. 9—Cleaning room in the cylinder casting department to which the castings are taken after they have left the smoke house where they have cooled

while not a supporter of life, is not by any means troublesome as long as it does not dilute the air to any great extent.

On the other hand, as soon as the flame goes out, un-

pleasant smoke and gases emanate from the casting. They must be taken care of or the air in the foundry becomes so thick that the place is objectionable for many men to work. This smoke is taken care of by long hoods com-

pletely covering the castings for a long section of travel along the chain conveyor. By the time they come out of the conveyor to the shake-out grates the castings are practically smoked out and, as soon as the sand has been shaken free, the castings are run into a smoke house with four large stacks creating an upward draft sufficient to carry away the heated gases.

Another phase of foundry work which, in the case of the Ford factory, has been solved in a manner which keeps the air practically free from offensive gas, is in the use of a continuous core oven. The racks containing the cores pass into a slot in the oven and not only form carriers for the cores but also are of such a size as practically to seal the oven. The elliptical layout is again used here, the oven having two doors, an entering and a leaving door, with the racks carried on an overhead track and suspended upon rods swung from the rollers passing along the tracks.

When the cores are removed from the racks, after they have left the oven, they are put on a flat belt. This carries them to the core stockroom where they are removed and put in the classified storage racks.

This mechanical means of transporting cores and of sealing the oven, in addition to keeping the work continuous, has solved one of the largest difficulties usually encountered in foundry work. That is, it keeps a real

continuous production and at the same time has a continuous oven arrangement sealed at all times.

During the summer, foundry conditions generally are such that the men drink a great amount of water. It has been found that ice water placed within reach of the foundry workers is a big temptation. The men, being warm and overheated, will consume large quantities of the ice water, generally resulting in upset stomachs and putting them in bad physical condition. All of the drinking water at the Ford foundry is held at a definite temperature, which has been found to be pleasant, but not injurious.

The mechanical methods do not require large space. In fact, for an example, the cylinder block castings, of which about 125 tons are being turned out daily, take up less space than 25 tons in the usual jobbing foundry. There is a portion of the foundry set aside for art work, which closely parallels the usual job foundry. The space required for this is much larger than that for the cylinder production department. This, of course, indicates that, where straight production work is turned out, the foundry can be designed mechanically to take care of it, and results not only in a place far more pleasant for the workmen but also in the highest possible efficiency of the foundry from a straight output consideration.

## Unusual Spring Features Mark Truck Line

**T**WO features of particular engineering interest are incorporated in the trucks now in production by the Service Motor Truck Co. These include a new oiling system for the spring shackles and a method of maintaining the alignment of the rear wheels while using Hotchkiss drive.

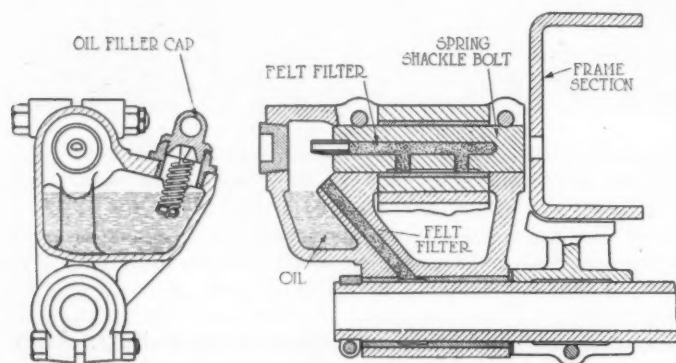
The method of spring bolt lubrication as applied to the 1½ ton model is illustrated herewith. A reservoir is cast into the spring shackle or bracket as a container for the lubricant, and holds oil sufficient for a month of ordinary usage. Oil finds its way from the reservoir to the spring bolts through a system of holes drilled in the spring shackles and bolts. These holes are sufficiently large to avoid the possibility of clogging and are filled with felt packing, to resist and regulate the flow of oil.

The spring bolts use oil only when the truck is in motion. To prevent surplus oil being delivered to the bolts when the truck is idle, the oil holes do not open directly into the lubricant in the reservoir, but come out at a point above the oil level. The holes, therefore, depend upon their supply from the splashing of the lubricant while

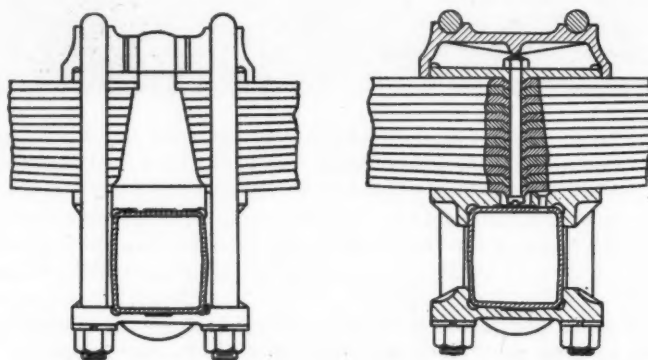
the truck is in motion. The oil feed is also restricted by the felt packing to a flow just sufficient for the needs of the spring bolts. The reservoirs are filled through openings covered by caps that are held securely to their seats by springs. The reservoirs can be conveniently filled at the same time the engine crankcase is being given attention.

To prevent misalignment of the spring leaves, they are made cup shape at the center bolt so that when the spring is assembled all the leaves are fitted into one another, making it impossible for one leaf to slip over the other. A plate on the top leaf is dove-tailed into the spring and held in perfect alignment with the spring seat on the axle by the spring clip pad, which in turn is tied to the spring seat by risers straddling the spring at each side and registering in slots provided in the clip pads.

**T**HE Post Office Department has announced the opening of a parcel post service with Lithuania. Parcels up to a weight of 22 lb. will be accepted at the rate of 12 cents per lb.



Diagrammatic illustration of the method of lubricating the spring bolts on the 1½-ton Service truck



Method of tying springs to axle in combination with Hotchkiss drive on Service truck



# Reducing the Labor Turnover by Developing the Individual

Monotony work and blind-alley occupations have been recognized as a potent cause of labor turnover. This article outlines a plan which is being successfully developed by a machine tool concern to get rid of the two difficulties. Parts may be adopted, with modifications, in almost any plant.

By Norman G. Shidle

**W**HEN a man performs the same labor operation over and over again, day in and day out, it is almost impossible for him to retain interest in his work. Such work tends to do one of the two things. Either it kills ambition and enthusiasm or it makes the man discontented. In the former case his work suffers, in the latter he leaves the plant, rather aimlessly hoping for better things elsewhere. Employment managers know that it is difficult to learn the real cause for which a man is leaving. This difficulty often arises because the man himself has no clear idea of the reason. His work has simply become monotonous, he sees no chance of learning anything more and so he just "moves on."

On the other hand, modern industry has developed in such a way that the production manager has found so-called monotony work a practical necessity in many cases. It has not seemed possible to avoid this type of job and at the same time to obtain satisfactory production. Industrial practice has seemed to indicate that production goes up in proportion as the various units of work are specialized and as men are thoroughly trained in those specialized operations. Thus, even though monotony work has been recognized as a cause of labor turnover, production necessities have hindered its elimination.

One successful machine tool plant, however, has found it possible to eliminate to a large extent monotony work and blind-alley occupations. The plan is not a theoretical one but rather it is a development of years of practice combined with details secured from various sources and adapted to the needs of this particular plant.

## Personal Development and Production

The basic idea, from which the present rather definite plan has been evolved, is that a working force of intelligent, thinking, enthusiastic men will produce a better article in greater quantity than a force of highly specialized machine-like men and that such men can be developed only by giving them an opportunity to learn as much and as rapidly as their ambition dictates. It is this idea, not primarily a desire to reduce turnover, that has motivated the management of the Fellows Gear Shaper Co. in the development of its plan, which obviously gives the workmen opportunity for personal development and advantage, but which also is believed to benefit the company in the long run; that is, the company is not in any sense "giving" the workman anything.

The following practice, in use at this plant for many years, was the genesis of the "promotion system" which has now been worked out in detail. The foremen and

superintendent kept a personal and interested watch on the work of the men under them. When a man appeared proficient on the machine he was operating, it was suggested that he go on another machine at the same wages. At the same time, he would be given the option of continuing at his present work with a slight increase in pay. The theory was that, if a man had ambition and enough desire to get ahead to invest something in himself, he would take the opportunity to learn more. Such a man could finally develop into a toolmaker or foreman and thus gain more ultimate benefit than by accepting the slight increase in pay without any corresponding increase in opportunity. Moreover, men who requested such an opportunity were permitted to go on other machines and to learn the various phases of machine tool work. Thus, every workman knew that he could have an opportunity to learn and finally to advance.

## The Promotion System

As an outgrowth of this practice, the promotion system was inaugurated several months ago. Since it provides at present only for those men who are almost entirely green to start with, it includes only a small percentage of the 700 men who comprise the plant working force. The promotion system is being developed, however, so that a man may step into it at any point, being given credit for whatever previous experience he may have had. When this development is fully worked out, it is expected that a great majority of the men will be participating. For this reason, the plan is of interest and importance as an example of a successful attempt to modify and to some extent to eliminate the difficulties of monotonous work and blind-alley jobs.

The promotion system works as follows: When a man is hired by the employment department, the plan is explained to him and he is given the opportunity to participate if he wishes to do so. No pressure is brought to bear, however, as the proper working of the system is largely dependent upon its including only men who have the ambition and desire to carry through the course.

The length of time necessary to complete the course varies with the ability of the man; he must know one job thoroughly before he is passed to the next grade. The average time for completing the course is about four years, although one man has finished it in 18 months.

The plant is divided into seven sections, according to the difficulty and skill involved in the various opera-

tions. Following are the sections and the work included in each:

Section 1	Section 4
Cleaning Castings	Final Assembly
Trucking	Engine Lathe
Sweeping	Section 5
Section 2	Grinders
Bench Assembly	Inspection
Drilling Machines	Section 6
Section 3	Gear Shaper Department
Milling Machines	Section 7
Turret Lathe	

The men are advanced from one grade to the next on the basis of tests, together with the opinion of the foreman of the department in which they are working. The tests are prepared by the employment department and are given out each week; they are divided into two parts of ten questions each. One part relates to shop problems and practice, the other to arithmetic. The man must learn and write out the answers to these questions each week. He may find them from any source he wishes—his foreman, books, his personal experience or elsewhere. The foremen never have more than twenty men under them, so that they are able as well as willing to answer any questions the men may ask.

Each lesson is preceded by a short foreword to the operator. This foreword enables the company to present to the operator some of the ideals of the firm and the opportunities which are open to him. The first lesson in the course is given as an example.

### Lesson 1 FOREWORD

The object in preparing these papers is to place before the inexperienced man entering the factory with the desire to learn what he can about the machine tool trade such questions as can be best given them in this manner. It is our intention to prepare one each week as you progress with your work. The question arising in your daily work will suggest the subjects for these sheets. The practical side will be taken up and as much of the theoretical as is necessary to perform general machine work.

These are not instruction papers, they are question papers. Go to your foreman when you are not quite sure. He is your instructor. You will find plenty willing to help you, but you must first be willing to help yourself. There are positions open to men who are qualified to fill them. The faster you progress the better we shall be pleased, but bear in mind that you are not big enough for a bigger job until you are too big for the one you already have. If your opinion concerning yourself does not agree with the opinion held by your foreman, try to judge yourself honestly. It might be that he is right and you are wrong.

The foremen throughout the shop we know to be as good as the best. They understand the work in their departments, and you will find them courteous, fair-minded, obliging men to whom you may go in time of trouble and receive a civil and reasonable answer to your inquiries. It is the wish of the family to have each new member enter with a spirit of good fellowship, and to be always ready and willing to help a fellow worker. If it happens that you have a grievance, do not sulk until you fancy that every man in the shop is using you wrong. Go to your foreman; confide in him. Remember he is your big brother and will help you.

In answering the questions, place the answers on the paper, numbering them to correspond with the numbers on the question sheet. Pass in to the employment office one week after you receive them.

The following things you should find out this week:

### SERVICE TRAINING COURSE QUESTION PAPER No. 1

1. Name, according to shape, the three hammers machinists use.

2. What kind of steel are machinists' hammers made from?
3. Name the form and material of the hammer used to strike heavy blows where the steel hammer would bruise or mar a finished surface.
4. Describe the center punch and state some of its uses.
5. Describe the scratch awl and state some of its uses.
6. Describe the flat cold chisel and state some of its uses.
7. Describe the cape chisel and state some of its uses.
8. Describe the diamond point chisel and state some of its uses.
9. Describe the round nose chisel and state some of its uses.
10. What is considered the best angle to grind a flat cold chisel for cutting cast iron?

### ARITHMETIC QUESTION PAPER No. 1

1. What is the difference between notation and enumeration?
2. What are the four fundamental processes of arithmetic and why are they called fundamental?
3. Write in figures: (a) five hundred, four; (b) eighty-one thousand, four hundred, two; (c) five million, four thousand, seven; (d) one hundred eight million, ten thousand, one; (e) thirty thousand, ten.
4. Write each of the following numbers in words: (a) 980; (b) 605; (c) 28,284; (d) 9,006,042; (e) 850,317,002.
5. 104 plus 203 plus 613 plus 214 equals what?
6. 6,354 plus 2,145 plus 2,042 plus 1,111 plus 3,333 equals what?
7. If a mine produced 7,018 tons in the first week of January, 7,236 tons in the second week, 6,348 tons in the third week and 2,543 tons in the fourth week, how many tons were produced in the entire month?
8. A week's record of coal burned in an engine room is as follows: Monday, 1,800 lb.; Tuesday, 1,655 lb.; Wednesday, 1,725 lb.; Thursday, 1,690 lb.; Friday, 1,648 lb.; Saturday, 1,020 lb. How much coal was burned during the week?
9. The total cost for erecting a steam plant was \$2,675. The engine cost \$900; the boiler, \$775; the fittings and connections, \$225. The remainder was expended in erecting the engine house. How much was the cost of the engine house?
10. The total weight of a car loaded with coal is 4,326 pounds and the empty car weighs 1,564 pounds. What is the weight of the coal?

The papers are turned in to the employment department and are graded. Sixty per cent is a passing grade for the arithmetic problems, while the shop problems are marked on an A, B, C, basis, C being the lowest passing grade. The papers are then returned to the men with the mistakes and corrections noted.

When a man has been graduated from the sixth section, previously mentioned, he is a skilled machinist and is capable, not only of doing excellent work in the tool room, but if he has the necessary executive ability, is capable of filling a foreman's job or any other position of a similar nature. First class toolmakers are difficult to procure. The success of this system in developing such skilled men is witnessed by the fact that only seven toolmakers have been hired from the outside during the last four years, and in this time the working force has increased over 300 per cent. Three of these are still at the Fellows plant, while the remainder of the forty-two toolroom men have been developed within the plant. This presents an exceptional record for toolroom turnover.

Foremen co-operation is necessary if a system of this kind is to succeed. While no definite reason can be stated for the hearty assistance which has been obtained at the Fellows plant, a logical surmise may be made. Practically every foreman in the plant has been promoted from the ranks of the workmen; he is a product of the methods and development of the plant. His



questions were answered when he was green, and others helped him to gain experience. Consequently he is ready to help others who ask him for assistance.

Does the plan work? From the standpoint of the workman, there can be little question. The men are, of course, paid the regular rates for the particular job on which they are working while they are gaining this experience. Thus they gain experience that makes them worth more money and earn a good living while doing it. But, from the company standpoint, as well, the plan is successful. While it is conducted largely for the benefit of the men, it results in the obtainment of the best possible quality and quantity production. The labor turnover figures render the decision. The monthly turnover at the Fellows plant averages about 3½ per cent while 7 per cent is the highest turnover in any month for many years.

The plan not only reduces labor turnover, but definitely affects general contentedness among the employees—although, it must be emphasized again, it was not devised or put into effect for that purpose. Its relation to unrest is best illustrated in a story told recently by the plant superintendent. It may be paraphrased as follows:

"Not long ago a middle-aged man came to work in our plant. He was a drill-press operator and had been working on that machine for twenty years. I knew that he was considered to be of the discontented type of workman who believes that the world is all wrong and that he has not had a chance. After he had been working here for a while I went over and began to talk to him. I talked as a friend, used his own type of speech and talked of the things in which he was interested.

"Soon he unburdened himself of his woes. He said he had never had a chance. He had been working on the same kind of machine for twenty years and he wasn't any further along than when he started, etc. So I said to him,

'How about your switching from this job and learning to run a couple of other machines. Then I'll give you a turn in the tool room. You can make good money there and you will have learned a great deal besides.'

"'No,' he replied, 'I tried that once, but I didn't like it. You have to work from blueprints, and do different things all the time. I like a job where I can come in and do the same thing every day.'

"Then I said to him, 'You have had your chance, but you didn't want to take it. You want success and advancement, but you are not willing to take the trouble and work that goes with it. Now, there isn't any use of you going around to these young fellows here, telling them that it is no use for them to work hard, produce more, or try to advance. When you say 'Look at me, I'm right where I was twenty years ago,' the young fellows in this plant can say, 'Yes, we are looking at you. Why don't you come along and take this course with us; probably there is an opportunity for you if you want it.'"

That this particular man was convinced of his error is of little importance. The important fact is that the influence of the discontented man is obviated by the mere facts of the case. It isn't that the management tells the men that hard work and ambition will mean advancement and opportunity; the big thing is that the opportunity really is there. Where the facts of the case are against the discontented man, his views have little chance of spreading. This is very different, however, from merely saying the facts are against him.

While the promotion plan outlined is still in the first stages of development, it offers an interesting example of a concrete attempt to eliminate the monotony of work in present-day industry and to restore to some extent an opportunity for pleasure in artisanship.

## The Automotive Industry in Great Britain

THE status of the automotive industry in Great Britain, so far as production, costs and sales prices are concerned, was briefed by Frank Lanchester, the president, at a meeting of the Society of Motor Manufacturers and Traders at London on April 8.

This society corresponds in Great Britain somewhat to the National Automobile Chamber of Commerce, in the United States, and the statements of Mr. Lanchester may be taken as being representative of the great body of the industry in that country. Quotations from the speech have just been received in America.

Lists prices of British cars now show an increase of 95 per cent over those of 1914, Mr. Lanchester said. This figure was reached as an average of some 30 factories, practically none of which has advanced its prices more than double those of the pre-war period. It also represents an appreciable advance in the last few months, as the figures for the latter part of 1919 were shown by the speaker to have represented an advance of some 65 per cent over those of 1914. Factory costs were shown by the following table, which assumed 1914 as a basis.

	1914	1919	1920
Wages .....	100	200/225	250
Steel, average.....	100	220	250
Castings .....	100	200	250
Aluminum .....	100	200	220
Timber .....	100	300	350

The figures for 1920 do not include the percentage increase that would be caused by the award agreed upon for the engineering union on June 1.

These advancing costs of manufacture would justify a similar increase on the sales value of the cars, Mr. Lanchester said, but they have been held down because of

improved machinery and plants which have turned out a higher production. Additional efforts in that direction, however, were thought to be necessary and the speaker recommended that British manufacturers should endeavor to obtain greater output from each worker.

"For the future," he said, "every effort must be made to increase economic production. An additional output of work per man per day is essential. Labor is beginning to settle down to work, with a better spirit than has been shown during the past twelve months and the recent recognition of piece work and the bonus system by the trade unions also has improved the situation.

"Employers must continue to show the fullest enterprise in the use of all mechanical improvements that would maintain the quality and increase the quantity of output. A further endeavor in the reduction of costs is the system of quantity or 'mass' production. The unification of types, reduction in the cost of car parts and lightening of the load of 'dead expenses' are factors that would reduce the price and benefit the buyer.

"Labor conditions are improving. Men are settling down better. New workers are being drafted into the industry, of whom works managers have reported excellent results but the 'all clear' cannot yet be sounded. Other traders have had, and are having, difficulties that reflected on the raw material supply. The steel manufacturers are unable to cope with the demand, owing to the shortage of coal. There are other troubles, owing to delay with the supply of raw materials as well as transport difficulties, but none is so serious as the shortage of steel."

# Comparative Power Properties of Alcogas and Aviation Gasoline

The results of tests with these fuels, using a 12-cylinder Liberty engine under varying conditions, are announced by the National Advisory Committee for Aeronautics. The data obtained from the compression changes, among the other results, are particularly interesting.

By V. R. Gage, S. W. Sparrow and D. R. Harper\*

MIXTURES of gasoline and alcohol when used in internal combustion engines designed for gasoline have been found to possess the advantage of alcohol in withstanding high compression without "knock" while retaining advantages of gasoline with regard to starting characteristics. Tests of such fuels for maximum power producing ability and fuel economy at various rates of consumption are thus of practical importance with especial reference to high compression engine development.

Aviation alcogas, prepared by the Industrial Alcohol Co., for trial by the Navy Department and by the latter submitted to the Bureau of Standards for test, was a mixture apparently of about 40 per cent alcohol, 35 per cent gasoline, 17 per cent benzol, and 8 per cent other ingredients. This is not the alcogas prepared for commercial or passenger-car use. The exact composition and methods of manufacture are a trade secret.

\*Abstract of Report No. 89 of the National Advisory Committee for Aeronautics.

The tests made for the Navy Department consisted in a direct comparison in a 12-cylinder Liberty engine, between alcogas and standard "X" (export grade) aviation gasoline with respect to maximum power attainable, and

fuel consumption with the leanest mixture giving maximum power. The tests were made in the altitude laboratory of the Bureau of Standards, where controlled conditions simulate those of any altitude up to 30,000 ft. The speed range covered was from 1400 to 1800 r.p.m. and the altitude range from ground level to 25,000 ft. Two series of comparisons were made, one with 5.6 compression ratio pistons and one with 7.2 compression ratio pistons. The actual compression pressure as measured at 900 r.p.m. was about 125 lb. p. sq. in. with the 5.6 compression ratio and about 170 lb.

with the 7.2 compression ratio. The physical properties of the two fuels used in these tests are given in Table I and Fig. 1.

The manner of conducting the tests was, briefly, as follows: The engine was started on one of the fuels,

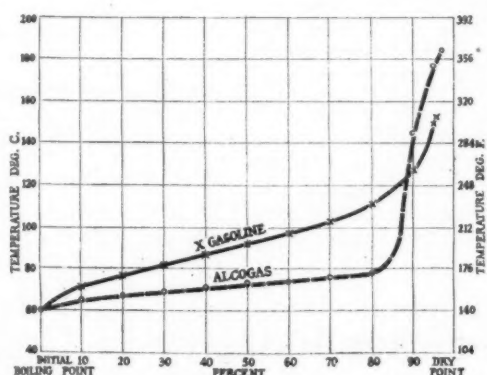


Fig. 1

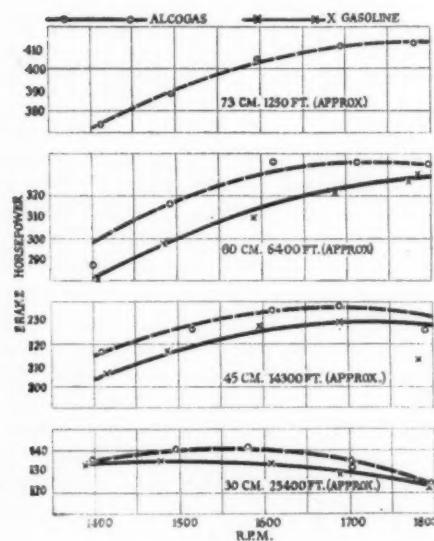


Fig. 2

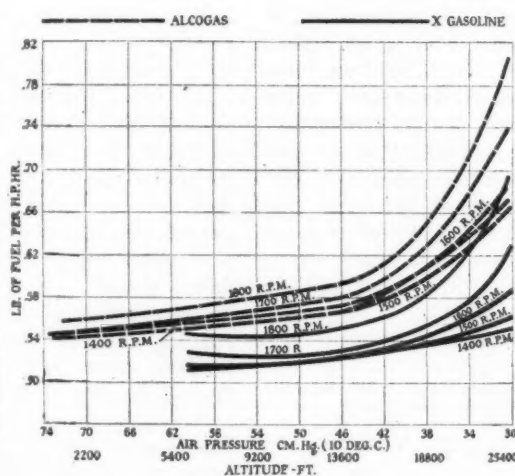


Fig. 3

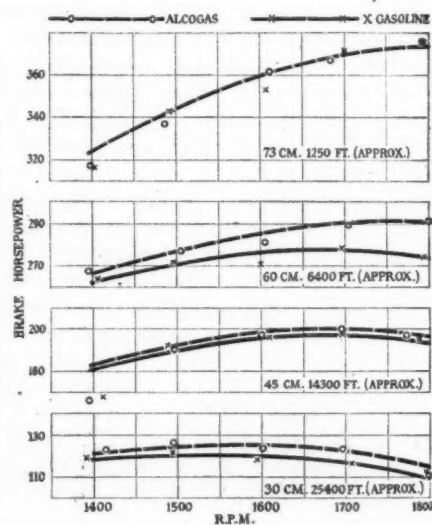


Fig. 4



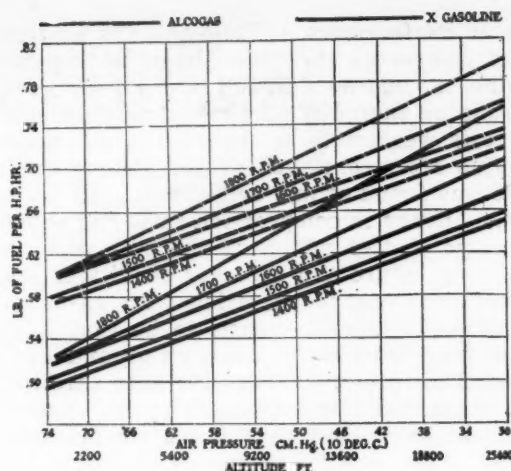


Fig. 5

TABLE I

DISTILLATION AND OTHER PROPERTIES OF ALCOGAS AND X GASOLINE

	Aviation Alcogas	X Gasoline
Heating Value (Total)		
B.t.u. per lb. ....	15,910	20,340
Calories per gram ....	8,840	11,300
Appearance .....	Clear lavender	Clear water white
Odor .....	Alcohol and ether	Gasoline
Specific gravity at 15.6 deg. C., 0.799		0.710
Reaction to litmus .....		Slightly acid
Corrosion .....		Black deposit
Gum per cent .....		0.02

and the air, load, speed, oil, jacket, etc., conditions were adjusted. Starting with a mixture known to be rich, the fuel supply was gradually reduced and the maximum torque noted, the "leaning" of the mixture being continued until the torque was appreciably below its maximum value; then the fuel flow was increased only enough to obtain again the maximum torque. All the data in this test were secured with engine throttles wide open. When conditions and adjustments were as desired, observations were made of the speed, load, various pressures and temperatures and quantities, while the time required to use a certain weight of the fuel was noted. At the end of the run on one of the fuels, the valves were turned so as to supply the engine with the other fuel. After sufficient time to be sure that none of the

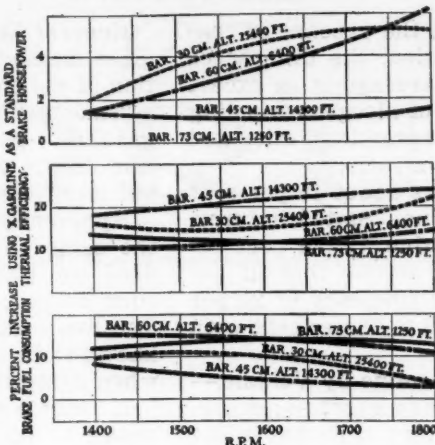


Fig. 6

previous fuel remained in the line unused, the carburetor was again adjusted for maximum torque with minimum fuel, in the manner described above. By following this procedure, there was little chance for any change of engine condition to enter into the comparative results from the two fuels. After the tests with ordinary (5.6) compression ratio, the engine was taken down, the special 7.2 compression pistons were put in, the engine was thoroughly cleaned, overhauled and some replacements of parts made. This overhaul had no influence on the comparison of the two fuels with either one of the compression ratios, all such comparative runs being made according to the procedure just described, which eliminates engine changes.

Other comparisons, such as that of the engine performance under different compression ratios, may be affected to some slight degree by the overhaul, and deductions from slight data will not have quite as high a degree of accuracy as they would from a test conducted with primary attention to constancy of engine conditions. It should be noted that the rather marked reverse curvature of the heat balance curve, showing percentage of heat in exhaust, is undoubtedly a real reversal with altitude and not a mere accidental coincidence of some undetermined cause depressing or raising values. This conclusion is partly from results of other tests (with different fuels) where in numerous instances evidence has appeared that most complete combustion of fuel is secured at conditions corresponding to the altitude of 10,000 to 15,000 ft.

**Brake Horsepower.**—The alcogas shows a better maximum power producing ability than X gasoline at all speeds and altitudes, except at ground, the maximum difference being 6 per cent. At ground level, the two fuels gave the same result at 5.6 compression, while at 7.2 compression, comparison was omitted because of the tendency of gasoline to knock at such high compression. The most common difference, omitting the extremely high and low speeds, and considering all altitudes, is about 4 per cent, which may be accepted as the figure for superiority in brake horsepower of alcogas over X gasoline.

**Fuel Consumption.**—The gain in power producing

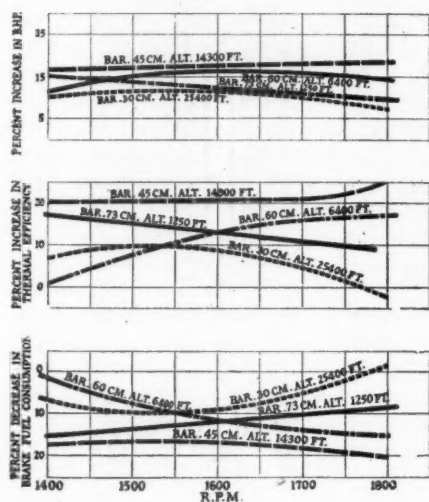


Fig. 7

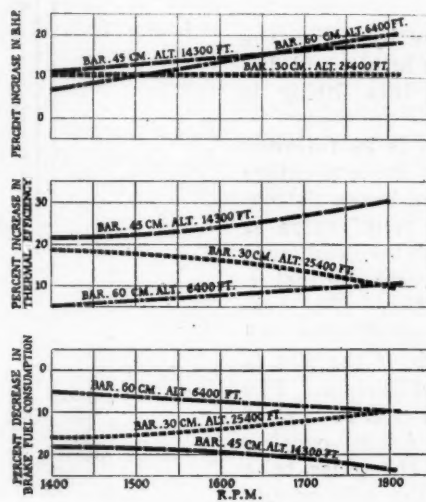


Fig. 8

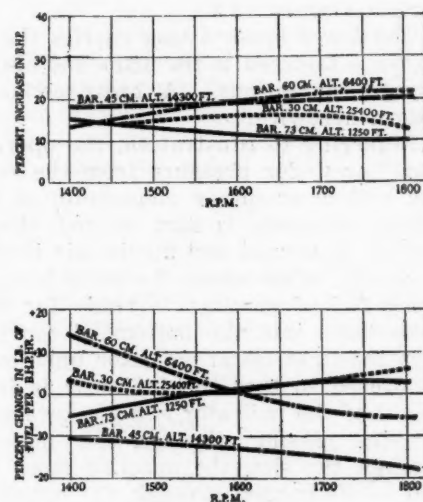


Fig. 9

ability noted above for alcogas is at the expense of considerable increase in fuel consumption, the differences reaching 20 per cent. The general average is an excess consumption, per brake horsepower, of alcogas exceeding 10 per cent (by weight) at 5.6 compression ratio, and nearly 15 per cent at 7.2 compression ratio.

**Thermal Efficiency.**—Alcogas shows about 15 per cent higher thermal efficiency than gasoline. Stated in terms of brake thermal efficiency of an engine, 15 per cent superiority of alcogas over gasoline means that if an engine using gasoline has a thermal efficiency of 25 per cent, it would have an efficiency of 28 to 29 per cent with alcogas.

**Comparisons of Alcogas and X Gasoline by Volume.**—Alcogas is 12 per cent more dense than gasoline; consequently all the above figures are very different when comparison is made on the basis of the pint or gallon as a unit instead of the pound. The maximum brake horsepower attainable is independent of this unit, so that the figure is 4 per cent as before. The excess fuel consumption per brake horsepower of 10 to 15 per cent of weight, becomes practically zero on the volume basis. The total heating value per gallon of alcogas is about 106,000 B.t.u. and of gasoline 120,000 B.t.u., a difference of 12 per cent referred to gasoline as a base, instead of 22 per cent difference as by weight. This figure is seen to be of the same order of magnitude as the difference in thermal efficiencies of the fuels. Computing the effective useful work obtainable (product of B.t.u. supplied and thermal efficiency) it is found to be the same from a gallon of either alcohol or gasoline.

**General Engine Performance.**—While there is no tangible method of comparing the "smoothness" of operation of the engine, the testing staff felt that alcogas gave a "smoother" running engine at all times than did the X gasoline. No tests were made to determine the condition of the engine after continued use of alcogas fuel, but no evidence was found of any evil effects.

Apparently the change in compression ratio has about the same effect, no matter which of the two fuels is used, until the temperature and pressure conditions are such as to cause poor engine operation with gasoline. The main advantage of alcogas seems to be that it is known to be free from tendency to knock on ground level when using the 7.2 compression with wide open throttle.

It is safe to state that the increase of brake horsepower at 7.2 compression over that at 5.6 compression averages at least 10 per cent for all speeds and altitudes and that the fuel economy for maximum power is improved, so that the fuel consumption per brake horsepower and the thermal efficiency are at least 10 per cent better with the higher compression.

Since a 7.2 compression is generally considered too high for gasoline fuel, it is of interest to compare the engine performance with alcogas at this compression with its performance with X gasoline at the 5.6 compression. An examination of this comparison shows that alcogas with the 7.2 compression pistons gives a general average of about 15 per cent more power than X gasoline with the 5.6 compression pistons. The pounds of fuel per unit power is about the same, perhaps favoring slightly the use of alcogas with the higher compression.

## Schroeder Flowmeter for Measuring Gasoline Feed

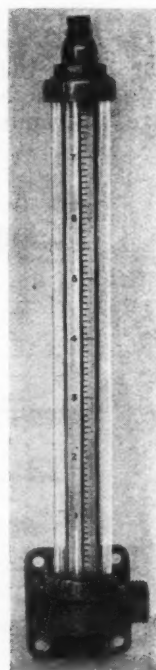
MAJOR R. W. SCHROEDER, of the Airplane Engineering Dept., McCook Field, whose altitude flight recently caused wide comment, is the inventor of a flowmeter intended for measuring the flow of gasoline to an aircraft engine. This meter, by a few changes, may be adapted for use on automobile or other engines.

The meter is of the variable orifice type. It consists essentially of a vertical glass tube about 1 in. in diameter, containing a graduated metal tube having a narrow vertical slot. A light cylindrical metal indicator slides within the metal tube, the variable orifice being formed by the part of the slot which lies below the indicator. The glass tube is closed at each end by a small bronze fitting, the joints between the tube and fittings being packed by cork gaskets.

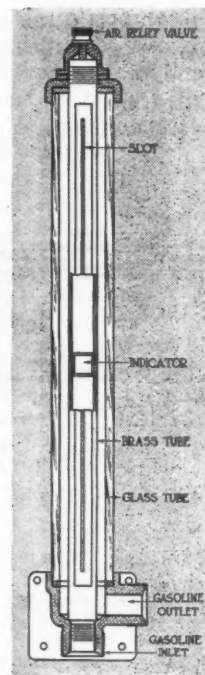
The lower brass fitting carries the plate by which the meter is fastened to the plane and also the intake and discharge connections. A cross-section of this fitting is shown herewith.

Referring to illustration, the operation is as follows: Gasoline under pressure from the supply system enters the bottom or intake connection of lower brass fitting. When the meter is first started, the air relief valve at the top is opened and all the air in the meter is allowed to escape, after which the valve is closed and the meter, being full of gasoline, is ready for operation. The gasoline flows into the bottom of the graduated tube and lifts the light metal indicator until enough of the slot is uncovered so that the indicator is in equilibrium. The height of the indicator is a measure of the rate of flow of gasoline passing through the meter. After passing through the slot, the gasoline flows into the glass tube and is discharged through the outlet at the side of the lower fitting. As designed for airplanes, the meter is 11½ in. over-all, with a 1 in. diameter glass tube.

To ascertain the value of this instrument and its accuracy, as well as to determine its calibration, a series of tests were made at McCook Field. It was found that the metering was correct in a vertical position. When climbing or diving at 30 deg. the greatest error amounted to 0.04 gal. per hr., which is practically negligible.

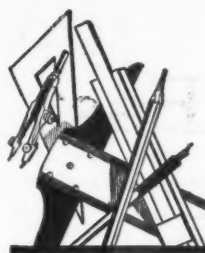


Photograph of Schroeder flowmeter



Sectional view through the Schroeder flowmeter





# The FORUM



## Advertising Quality

Editor AUTOMOTIVE INDUSTRIES:

ANSWERING your inquiry as to our opinion of the value of "artistic" advertising as exemplified by our recent booklet, I will turn the question to say: Does it pay to get out the kind of advertising we distribute?

The editor has special reference to our booklet advertising; it is just as well to add here that we use considerable magazine space and that in this we strive toward the same goal as in our booklet advertising, though they differ greatly in method. The booklet gives the widest possible latitude in the design and composition of the message you wish to deliver. You can make your booklet just what you wish it to be. The magazine advertisement, on the other hand, is restricted by size, and by numerous other considerations. The magazine advertising page is valuable because it reaches a greater number at less expense, though with not as complete a message, than will your booklet. Both must therefore be used for proper results.

A booklet or other piece of advertising literature has one main purpose: to acquaint people with your product and to make them desire to buy. There are many ways of doing this, depending on the nature of the product, its use, cost, etc. With us getting out a booklet means not only to tell what we make, but to tell also how it is made, the materials used, why it is made the way we make it, what sort of people actually make it, and what kind of a plant it's made in. You will see that in our literature we try to give a reader all the information about our product that he could get for himself if he made a visit to our plant and inspected every department.

Our literature must measure up favorably with the products we make, which the booklet is meant to advertise. This literature ought to reflect the products; the least it can do is to truly represent them.

If the product is made by high grade, skilled workmen; if it is made of material of highest quality; if it is made to meet a standard and not a price; if it is made by men who like to make it, who work in a plant that is beautiful as well as efficient—then in justice to these men and their product the facts ought to be made known. It's up to the advertising department to do it.

The Clark Equipment Company has a plant of which every man in the organization is proud. We have an unusually fine bunch of men running our plant. They know that these motor truck axles must stand up under severe service. They know that they must turn the wheels of motor trucks valued at several thousand dollars. They know that their tools have made a reputation and they mean to uphold that reputation. The name Clark and "Celfor" means much. To them it means that our products are the best of their kind and made in the best way they know how to make them.

The advertising department must do justice to all these factors when addressing prospective and present users of our products. That means that we must put out some good-looking and expensive booklets. We reach only a selected few with our booklets, but we reach those few as we want to reach them, with all we've got, and it

pays. All we actually do in our booklet advertising is to bring our entire plant to the desk of the man interested in what we make. Having done that we feel we have done everything possible. The result is well worth the effort.

E. W. CLARK,

Advertising Manager, Clark Equipment Co.

## A Non-corrosive Flux

Editor AUTOMOTIVE INDUSTRIES:

IN reference to the paragraph in *Automotive Industries* of April 8 regarding soldering flux, the following information may be of interest:

There is no absolutely non-corrosive flux on the market, but the nearest approach to this ideal is probably attained by the use of a compound composed of rosin and stearic acid. The Naval Aircraft Factory has been using, for some time past, a flux composed of 75 per cent stearic acid and 25 per cent rosin. It is practically non-corrosive but it is not quite so powerful as the commercial fluxes; at the same time it is very satisfactory if the men do not expect to rely on it to actually CLEAN the surfaces.

I would suggest that your correspondent write to the Bureau of Construction and Repair of the Navy Department, requesting a copy of "Aeronautical Specification No. 116A," which covers the requirements for this flux.

The average commercial flux is composed largely of ammonium chloride, although the manufacturers sometimes claim to have a "secret" composition. Ammonium chloride is very hygroscopic thus causing accelerated corrosion in the presence of moisture.

ARCHIBALD BLACK

## Automobiles on Railroads

Editor AUTOMOTIVE INDUSTRIES:

WE are much interested in the article entitled, "Solving the Problems of the Railway Motor Car," which appears on page 21 of your Jan. 1 issue, as we have been making a line of special equipment for use in putting an automobile truck on the railroad track.

We have been in this line of work for a number of years and our experience has been that it is necessary to put a pony truck under the front end in order to operate an automobile with any degree of safety on the railroad track.

We have found also that the passenger or touring car, as shown in the upper right-hand corner of page 21, will not stand up in this service, as the axles will become crystallized and break in service, due to the constant jar and vibration to which they are subjected in railroad service.

CLIVE HASTINGS.

## Correction:

THREE blind advertisements on lubrication appeared in the advertising section of *AUTOMOTIVE INDUSTRIES* on the following dates, Feb. 26, March 4 and March 11, and in each case the word "advertisement," which should have appeared at the bottom of the page was omitted by mistake.

# Economic Situation in the Far East Makes American Car Market

An American editor and writer of Yokohama has written this article for the purpose of showing how interior conditions of Japan and China make them a worthy export field, the greatest drawback, of course, being the lack of better roads. This article surveys these markets.

By Roderic C. Penfield\*

**W**ITHIN the last five years, such countries as Japan and China, heretofore a by-word, especially the latter country, for poverty and cheap-living, have added enormously to their financial resources. Particularly is this true of Japan, which before the war had barely twenty million yen above the lawful reserve, but now has probably over two billion.

As in Occidental countries, the Orient is feeling the high cost of living. Wages have almost trebled and so even a small margin for saving or expenditure for goods other than necessities, has greatly enlarged the Japanese purchasing power. Moreover, the natives of Japan and China have acquired a yearning for the comforts and conveniences that obtain in the United States. Their tastes for better homes, better clothing, more amusements and more facilities for business have been developed through travel in the United States and elsewhere. Every Japanese who comes to the United States goes back a potential salesman for everything American, from neckties to motor cars.

There are altogether in Japan approximately 5,000 cars of all types; in China, perhaps less than half of that number. Tokio has its "automobile row," where some ten or a dozen concerns have showrooms and maintain cars in stock for sale, as well as carry on garage and repairshop work. In addition to the establishments in that locality, there are others in various parts of the city. In Yokohama, there are several large garages, and in Kobe, where the foreign element is also in strong evidence, garages and repairshops are considerable in number.

The chief obstacle heretofore to rapid growth of the motor industry in both Japan and China has been the lack of good roads. A campaign is under way in Japan for the improvement of the highways in the neighborhood of the large cities. Travel between Tokio and Yokohama is now maintained along a narrow road. For the 18 miles between the two cities, except about four of which are through country, the roadway is lined on both sides with houses, small factories, etc. This makes traffic slow and exceedingly liable to accident, as dogs, children and grown persons are alike careless in permitting motor cars any right of way.

A new road is to be constructed entirely separate and apart from the one in existence, at a cost of about \$2,500,000, and it will greatly facilitate motor traffic of all kinds between the two cities. Yokohama, being the seaport for Tokio, naturally makes necessary a great amount of merchandise and general travel to be carried on between the two cities.

When incoming freight for Yokohama is released in the Custom House, it is taken to Tokio in three ways: by water, steam train and wagon. The former frequently requires a long haul at the Tokio end, and, in many cases, this also applies to freight sent by railroad, which requires hauling at both ends. The Japanese realize that freight, by being loaded on trucks at Yokohama, can be delivered more cheaply and expeditiously directly to the door of the owner in Tokio than by any other method. Moreover, there are a great number of large and small towns in Japan not reached by the steam trains, and the motor truck offers a solution to such a problem that cannot be overlooked.

The Japanese chauffeurs are, as a class, poor mechanics and rather resent having to take care of a car. The result is that a car ages in about one-third of the time that it does in this country unless the owner himself sees to its proper maintenance. Moreover, the Japanese chauffeur realizes that, if he makes his own repairs, there is no chance for the "rake-off" that he will undoubtedly collect from the garage and that, while the car is under repair he is, of course, enjoying a vacation at the owner's expense. This state of affairs unquestionably will be remedied and perhaps it is, after all, only a stage similar to that in Occidental countries during the first stages of the motor's career.

In China, the chauffeur receives a monthly wage of about \$25. For that he simply drives the car, paying out of his salary a coolie to wash the machine whenever necessary and another coolie, of a higher grade, to keep the car in order. In Japan, the chauffeur's salary is from \$35 to \$45 per month. Now and then one is found who takes an interest in the car and keeps it in good order, but most of them limit their attentions to washing and polishing it and putting oil in the most convenient grease cups.

There are many cars in Japan owned by natives who have acquired sudden wealth through various war transactions. Most of them buy the chassis and have closed tops built. Such tops are constructed entirely of wood and are an excellent imitation of the bodies sent out from this country. A body for a five- or six-passenger car costs about \$600, and there is thus a considerable saving over bringing the car complete from America, the saving being not only in the cost of the body but also in the freight.

In China, the majority of the cars are the touring type and are imported complete. Probably three-quarters of the cars used in China are of American make, the English and French factories not having been much in evidence before the war and, of course, shipping practically nothing to the Far East during the war.

\*Of the World Salesman, Yokohama, Japan.



Nearly all the important American cars are represented in Japan. Contracts for at least a dozen makes hitherto unknown there have been signed in the last two months. The cars most seen are, of course, the Fords. There are several hundred of these in the taxi service in Japan. Others much in use are the Buick, Hudson, Overland, Oakland, Studebaker, Chandler and Chevrolet and additional makes are being introduced.

The motor bus service inaugurated a year ago in Tokio is doing well. It is being enlarged. Systems for Yokohama and Kobe are also being negotiated.

In China, the variety of cars is not as large as in Japan. The great drawback is the lack of good roads. There are but a few thoroughfares practicable for passenger cars radiating from Shanghai and the same may be said of Peking. The eighty-mile roadway planned between Peking and Tientsin is not completed but, when it is, it will probably give a great impetus to the automotive industry in North China, as again it is a case of where goods could be loaded from the customs dock at Tientsin at night and delivered the next day at Peking. Now, it is a matter of long hauls at both ends, with much delay from other sources.

China, once famous for her excellent roads, is now a by-word for execrable thoroughfares, no money having been spent on them for many years. In driving over a road three or four miles outside of Peking, I observed that it originally had been paved with blocks of stone about 1 x 2 ft. Many of them had sunk or been broken, and the result was that, although the chauffeur tried to pick a way by which we would not be jolted too much, he was simply unable to do it. In every few feet, there were probably two or three stones that had sunk several inches, with the result that we not only had to crawl along but were badly jolted about. The effect upon the car may well be imagined.

When I was in China last summer, I was told that the

plan was, upon the demobilization of the army, to put many of the men at work in establishing a new system of roads throughout the most thickly settled parts of the country. A man to whom I talked scoffed at this idea and said that the army would never be demobilized but, as a loan of \$25,000,000 is being negotiated with America for the express purpose of paying off and demobilizing the soldiers, it looks as though a definite attempt to improve the roads of that vast country might soon be under way.

What the development of good roads in China and Japan will mean to the American manufacturer of cars and equipment, is almost beyond comprehension. Moreover, the extensive system of canals in both China and Japan make for a good market for marine engines and accessories.

Although the price of gasoline is about \$1.10 a gallon through the Far East, nevertheless, at the present ascending scale of wages passenger cars and trucks have a bright future. It is probable, however, that many of the vehicles will be equipped to burn a low-grade fuel in conjunction with gasoline, thereby reducing the fuel expense.

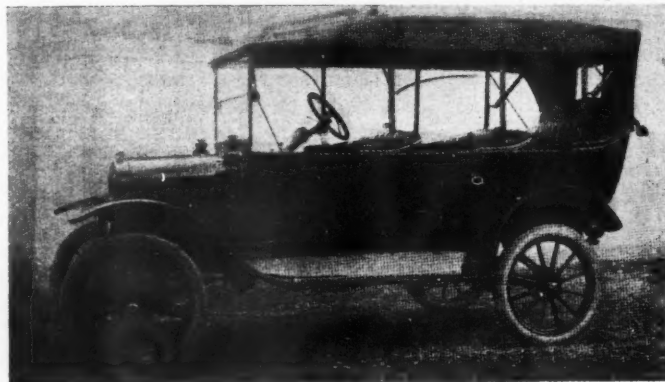
The long distance from this country will make it necessary to maintain large stocks of equipment in the principal cities. Until the native chauffeurs are educated to care better for the cars, the demand for parts and accessories will be much larger in proportion than it is in the older countries.

The present difficulty with exchange rates between Europe and America does not obtain in the Far East. In fact, the exchange now is decidedly against the United States. This makes it desirable for those in the East who have money to spend, to spend it now and, from all I know of the foreign trade situation, that is exactly what the shrewd and clever Japanese and Chinese are doing.

## The Japanese Ford

**B**ODY designs of American automobiles that are exported to foreign countries result frequently in a car that seems scarcely to resemble a car of the same make in the United States. The changes, of course, are made to meet the foreign conditions and sometimes arise from peculiar and almost unexpected reasons.

The photograph herewith is an instance in point. It is a three-seater Ford that carries six passengers. The Ford exporters to Japan—Sale & Frazar—ascertained that the Japanese required less foot-room than do the Anglo-Saxons and they learned also that the Japanese like to crowd more passengers into a car than is the practice



Ford chassis equipped with three-seated body built in Japan

in America. Consequently, the three-seats were accomplished by lengthening the body approximately one foot, by decreasing its width slightly to conform to the greater length and by making other slight alterations. The rear seat is not served by a door, the passengers entering through the middle seat, in a fashion similar to some of the four-seater American cars.

The body for the Japanese car shown here was built in that country, only the complete chassis being imported.

## Bakelite Propeller Put to Severe Test

**MAJ. WILLIAM OCKER** flying a DH-4 Goldbug from Aberdeen, Md., to Washington, D. C., equipped with the new Micarta or so-called Bakelite propeller put this propeller to a most severe test. Bolling Field had been in a very bad condition for about two weeks, the mud being 12 in. deep. Landing with a DH-4, which has a high landing speed, in mud is a particularly dangerous undertaking.

Hardly had his wheels touched the ground when his plane nosed over. Before he could reach for the switch to cut off his engine the propeller succeeded in churning around in the ground several times. The force of this churning was so great that it threw his plane back into position while the wheels sunk down to the hub in the mud.

When an examination of the propeller was made it was found to be in perfect condition and not even chipped.

# Meeting the Radical with Understanding and Agreement

In one day, Mr. Tipper received four requests to join societies "to combat something, to fight something or to stop something." To these, the reply was that he would prefer organizations "to understand something, to agree upon something and to produce something." His article this week, based upon that theme, should command the widest attention.

By Harry Tipper

THE railroad strike has brought out more clearly than ever our tendency to take sides upon a subject without any consideration of the reasons for the difficulty or the justice or injustice of the demands. We are, frankly, very tired of interruptions: we are thoroughly disgusted with the inconveniences we suffer on account of these interruptions: we are disturbed by the continual tendency of groups of men to give up their work and make it difficult for us to continue our own operations. We recognize that we cannot continue the present industrial organization if we are to be held up at every turn by the disagreement between employees and employers and the total disregard of the public necessities. So, our disgust is finding its expression in the increase of volunteers to take the place of strikers where the interruptions are important; in the organization of vigilance committees and in activities concerned with the protection of our food supplies and other necessities in case further disagreements occur.

Unquestionably, the methods of the strikers in the railroad trouble were bad. They struck without any previous demands having been scheduled, without warning and without giving the public any opportunity to express itself. They struck because of differences with their own leadership just as much as their dissatisfaction with their work. On the other hand, the only time the public has shown any tendency to inquire into the causes of the strike has been when the circumstances of the strike have seriously alarmed the general public because of the possible consequences. Hundreds of strikes have occurred without any public interest at all. Thousands of other strikes could occur without any show of interest outside of the parties involved; either in the justice of the matter or in the obligation for a fair settlement.

So soon as the public necessities have been intimately touched by a strike and have alarmed the people because of this fact, the interest of the public has been aroused. Even then there has been little discussion of the merits of the cause, but simply an endeavor at protection against the difficulties imposed by the strike. These things are to be expected, of course, and it is absolutely necessary that the public welfare should be protected against interruptions by bodies of workers, even though such workers may have reasonable cause for complaint.

These things, however, do not improve the situation. They afford a temporary relief from the difficulty, but they do not take the place of a just examination and they

do not increase the good feeling between the parties, nor lead to any expectation of better judgment over the next disagreement. There is no doubt that the dissatisfaction of the yard men and switch men was due to the dilatory methods of the Government in considering their position with respect to other railroad workers. This was not improved by the time consumed in the appointment of the Conciliation Board appointed by the bill which passed through Congress on the return of the railroads to their private owners.

As a matter of fact, this board was appointed after the strike commenced. The workers feel that the strike had something to do with the speedy appointment of the board and they feel that the strike was partly justified by that result. However that may be, the purpose of calling attention to the public interest in this matter is to point out that in our alarm and our desire to get through with these interruptions we are in danger of adopting foolish and hastily considered measures of repression or combat, which will simply sharpen the issues, lead to a clear definition of party and opinion and perhaps develop into a repression which is not desirable to contemplate.

There are several bills in Washington which would limit free speech if they were literally interpreted, and they might be interpreted to such a degree that they would amount to tyranny. Following the expulsion of the Socialists from the Assembly at Albany, bills have been introduced in that Assembly which could be so interpreted as to place the opinions and the convictions of every citizen under the control of the politicians or the judiciary erected to examine and enforce these acts.

New organizations are springing up every day with the purpose of combatting radicalism as it is called, and speeches, and propaganda which emanate from some of these organizations show a dangerous tendency to despise all liberal opinion, to classify all suggestions for improvement as socialistic and to demand complete suppression of activities which vary from the *status-quo*. Of course, it is not likely that these various bills will come through, nor is it likely that if they become law they would pass the court test as to constitutionality.

They are important because they illustrate the activity of an influential body of opinion, determined upon getting through with the present unrest and interruptions, without any understanding of the danger to democratic or free institutions in the adoption of such methods. Even this danger would not be important if the public were interested in really



studying the cause of this unrest and arriving at a judgment on the facts. The danger arises in the general tendency to arrive at opinions without study and largely on the basis of fear or annoyance.

These things affect industry because the suppression of strikes will not remove the unrest. The suppression of these strikes may remove the interruption and may enable us temporarily to pursue our business without the inconvenience and difficulty which has been attached to it for some considerable time. Nevertheless, the sentiments which caused the strikes will not have disappeared with their suppression and it will not have been changed simply by the difficulty.

It would be a most excellent thing for industry if the disagreements in each strike would be thoroughly aired in public. It would be a wonderful thing if the newspapers would investigate the facts of each case and point them out to the readers. Each such investigation and each such illumination of the facts would bring us nearer to an understanding of the matters involved and would make it possible for the whole discussion to continue with an increasing common groundwork of knowledge as to the fundamental necessities of industry and the fundamental limitations of Government.

There was never any fight that did not leave a trail of bitterness behind it and the longer we fight on subjects concerned with industrial operation, the more difficult it will be to get together upon any reasonable basis of understanding. Already the bitterness and suspicion involved are enough to make it a matter of patient, far-sighted policy and careful action, before the individual manufacturer can hope to transfer some of the loyalty of the worker from his craft to his organization and to imbue him with a sentiment of individuality sufficient to give him an incentive in his work.

Fortunately, the patient consideration of these matters is being worked out in a sufficient number of individual factories to show the possibilities contained in the proper study and endeavor. Publicly, however, we seem to make no advance in this direction. We lose entirely our human point of view when we pass from the intimate knowledge of human beings in our own surroundings to the abstract discussion of human beings in groups.

When we speak of an individual workman, "Smith," whom we know, we are obliged to admit that he has many good qualities, and when the worker Smith speaks of his boss, whom he knows personally, he is obliged to admit the same thing. When we substitute the word Labor for Smith we lose all sense of the human equation involved and consider it in the abstract vaguely as a force moving mechanically in a certain direction, with a definite strength of action without human qualities and oblivious to human understanding. When the worker substitutes the word Capitalism for "Jones," his boss, he considers it in the same way.

In this mass operation of industry and this group necessity of government which has grown up in the last century, we have learned to talk and to think glibly about labor, capitalism, socialism, radicalism and other abstractions as though they were definite entities to be measured and treated separately and apart from the individuals who composed them. We have almost lost sight of the individual entirely and are no longer capable of measuring the conditions as due to the individual and the individual equations. We have altogether lost sight of the fact that our progress in understanding must be a progress from the individual to the group and

not from the group to the individual. Individuals get together for common purposes and the groups change as the individuals within those groups become aware of different necessities and are forced to recognize different conditions.

To attack any group as a whole is simply to consolidate and to make it more powerful. The history of the trade union shows that it had better discipline and was more powerful (considering the number of its members) when it was bitterly opposed than it has been since it gained its recognition. The unity of its purpose has disappeared to some extent and its discipline has declined, as indicated by the internal division and by the lack of unity.

It is discussion, a larger measure of agreement and a much greater measure of understanding which will turn the fighting groups into the productive groups that are necessary for the development of industry, and the understanding must come to the individual and to a sufficient number of individuals in the different groups, so that the groups themselves are modified by the individual development.

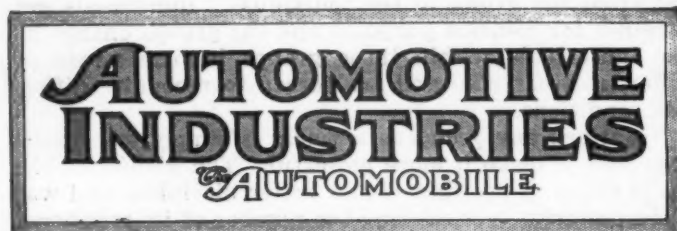
Industrially and in politics, we are talking too much about fighting in our anger at the interruptions and far too little about understanding and agreement.

In one day's mail there came to my desk four requests to join associations or societies to combat something, to fight something or to stop something. It is about time that these were changed so that they were requesting me to join associations with the endeavor to understand something, to agree upon something and to produce something. In this respect, industry at least is further advanced than Government and, while many industrial establishments are getting a better measure of understanding, a better spirit of agreement in their establishments, the politicians are introducing more measures of repression, more suggestions for prohibition of various things and more attempts to crush opposition instead of educating it.

Industry is very deeply and very intimately concerned with the action of the politicians, because these actions are likely to have a very large effect upon the unrest, which will find its expression through industry. The economic program of politics is growing and shows a tendency to grow. The spirit of its suggestion is not the spirit of development, and industry is likely to be retarded more seriously by the actions of the politicians in the future than in the past, unless industry proceeds with its work of educating the people and the politicians to the necessities and the requirements of the case.

Outlaw strikes are likely to occur again. There is a division in labor politics which is increasing and confidence in the leaders is not as complete as it was. The conditions which industry will have to face are not likely to decrease this division among the various organizations concerned with labor. Unless there is an increase in the development of understanding between the employer and his own employees these divisions are likely to prove more embarrassing than the unified control of the American Federation has been in the past. When there is no unity among the workers, or there is a division in respect of opinions as to their leaders and their program, it will be more difficult to deal with them unless the manufacturer has learned to deal with his own employees in connection with his own problems.

Education and understanding are the road to the matter and the manufacturer is in a better position to operate these things in respect of his own employees. His business depends upon the unity he can establish in his own organization.



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## Aiming at Something

**T**HE ultimate effectiveness of any department in a manufacturing concern is dependent to a large extent upon the work and co-operation of many other departments.

The man in charge of "welfare" work in a large New England automotive plant recently talked to an inquiring visitor enthusiastically and at great length concerning the bands, the baseball teams, the bowling leagues, the picnics, checker tournaments and other forms of employee activity which were being promoted by the company under his supervision. There was no doubt in his mind but that these activities had a very direct and significant effect in keeping the employees contented, in reducing labor turnover, and in increasing production.

The inquiring visitors later talked to the employment manager of that same concern, seeking to find verification in actual figures and in the experience of this official, who was in close contact with the labor condition and difficulties of the organization. When asked whether or not the plant welfare work had much influence upon labor turnover, he said: "As

far as my experience goes, it has very little, if any, effect upon keeping men with the plant for a greater length of time than they would otherwise remain."

Thus was brought to light not only a difference of opinion but a faulty organization. Personnel work must be aimed at something—if it is not aimed it will not arrive.

## France's Industrial Difficulties

**F**ROM reports in the press, it is evident that the French automobile industry is meeting with all sorts of difficulties and is as yet hardly in production, although nearly a year and a half have elapsed since the signing of the armistice. As substantiating this point, the American agent for a car produced by one of the largest aircraft engine manufacturers in France, who received his first car a fortnight ago, said that as far as he knew this was the first car completed by the firm.

The backwardness of the French industry has been a topic in press discussions and various reasons have been mentioned to account for it. In this connection it is well to point out that prior to the war France had the largest automobile industry in Europe and did the largest export business in automobiles in the world. As the manufacture of automobiles for private account was entirely stopped at the outbreak of war, an enormous potential market has undoubtedly developed in that country, and even in spite of the fact that the French Government took over the entire automobile equipment of the American Expeditionary Forces and disposed of it to the general public, there must still be a large market for passenger cars. But, in spite of this pressing demand, the factories are turning out very few cars. It is true that the French factories were struck harder by the war than any others, with the exception of those of Belgium. They had to change over from automobile production to the production of munitions in a day and the minds of their staffs were turned away from automobiles for the next four years and a half, during which time, no doubt, some of the technical organizations went to pieces.

But all this would not account for the slow comeback of the factories. If it had not been for factors which became operative only after the cessation of hostilities, the factories should have been in full production at the beginning of the current year at the latest. There have been three factors which have been holding them back; all of these are more or less interlinked and might be grouped under the general heading of economic difficulties. The first is the restlessness of labor, which is due in large part to the high cost of living and finds expression in frequent strikes; the second is the scarcity of coal and raw materials, and the third is the adverse rate of exchange. As long as the war lasted immense quantities of raw materials and manufactured goods were poured into France, the imports being financed by foreign loans. When the war ended the loans ceased, and as the imports continued it was not long before the franc fell to a fraction of its nominal value. The low rating of the franc would be a help



in disposing of French goods in foreign countries but until the products have reached the marketable stage it is a decided handicap.

The French makers are chafing under the handicap of the adverse exchange and some radical means of eliminating it have been proposed. But the disease of which the unfavorable exchange is the outward manifestation is a deep rooted one and the cure can be effected only slowly.

## Similar Laws but Different Meanings

**W**HETHER it is the front lights or the rear lights which are "visible in the direction in which the motor vehicle is proceeding" is a point raised by the conflicting laws of different States. The Alabama law bearing upon the point is as follows:

"The rays of such rear lamp shall shine upon the number plate carrier on the rear of such vehicle in such manner as to render the numerals thereon visible at least 50 ft. in the direction in which the motor vehicle is proceeding."

In the following extract from the New York law practically the same language is applied to headlights:

"Except as otherwise provided in this section, such front lights shall be visible at least 250 ft. in the direction in which the motor vehicle is proceeding."

The confusion of ideas seems to be due to the different positions supposed to be occupied by the observer. "Visible from a point 50 ft. to the rear of the vehicle" would establish with sufficient accuracy the position of the observer of rear lights in Alabama. "Visible from a point 250 ft. ahead of the vehicle" would determine the position of the New Yorker observing the headlights of an approaching automobile. It might be remarked also that a lighted match would be visible 250 ft. ahead of the car and that scientific terms are needed if the candle-power is to be fixed.

Such inaccuracies of the law may seem trivial, or even amusing, until some vital case in court hinges upon a mere interpretation, when the matter appears more serious. Uniform laws are worth considering in this connection. The present status of the laws of the several States is a hopelessly entangled mass of unintelligible verbiage.

## One Wage Increase Since 1848

**T**HE automotive industry should be especially interested, at the present stage of development, in a better and more efficient Patent Office. A recent report on the status of the Patent Office said that there had been only a 10 per cent increase in salaries for the expert staff of the office since 1848.

The Commissioner of Patents, J. T. Newton, explained that under present circumstances he is unable to hold good men as examiners. About the only reason competent men accept such positions to-day is to get the experience necessary for entering the employ of patent attorneys or commercial firms requiring

such experts. As a result, the work is coming out slowly because the men are not familiar with the routine, and reports on pending patents are far behind.

Recently a bill was passed by the House of Representatives which would do much to relieve this condition and make the office more efficient, if it becomes a law. The bill is before the Senate and favorable action is hoped for, but it might be well worth while for manufacturers and organizations, which are so greatly interested in patent work, to call the attention of Senators to this need. It is rather unusual that the Patent Office has never been an expense to the Federal Government, as it is one of the few departments that always has paid a profit on its operations. The bill under consideration raises the fees somewhat, with a view of keeping the office on a self-supporting basis.

## Cylinder Wear

**O**RDINARILY the wear of a gas engine cylinder is greatest in a plane at right angles to the crankshaft because in this plane occurs side thrust on the cylinder wall due to the angularity of the connecting rod. If the engine is well designed and well made there is no pressure of the piston on the cylinder in the plane of the crankshaft; there is, of course, the pressure of the piston rings but, as compared with the pressure due to the angularity of the connecting rod, this is negligible.

According to a recent British paper on Diesel engines, cases have occurred with such engines in which the cylinder wear was greater in the plane of the crankshaft than at right angles thereto. This, of course, can happen only as a result of poor design or poor workmanship. There are two conditions which would result in excessive side wear. If the piston is not accurately at right angles to the crankshaft it will cock in the cylinder, which, of course, will give rise to excessive friction and wear. Secondly, if no adequate thrust bearing surfaces are provided on the crankshaft the end thrust may come on the pistons, where, owing to the higher speed, the wear is apt to be much greater than on the crankshaft thrust surfaces. In automobile practice the second cause is generally obviated by providing a generous clearance, usually of the order of  $\frac{1}{8}$  in., between the connecting rod hub and the piston bosses.

There is hardly any need for insisting here upon the importance of correct alignment of the piston with the crank. Factory inspection methods fully cover this point and a poorly aligned engine is not likely to leave a modern plant.

**A**CCORDING to a note in a French paper, Poland is probably the one of all the civilized countries having the fewest automobiles. During the war the Russians during their retreat took along every car that seemed usable and later the Germans made requisitions. When the new Polish army was organized it had only a few automobiles which had been abandoned by the Germans. There is not a single taxicab in service in Warsaw, a city of more than a million inhabitants; gasoline is very difficult to procure and farm tractors are unknown.

# Industrial Cities, Big and Little, Seek Better Housing Conditions

## Business Proposal to Alleviate Unrest

### Improved Home Conditions Designed to Check Progress of Radicals

Inadequate housing is admittedly one of the most potent causes for the wave of industrial unrest which has swept over the country. The problem is nation-wide, and in nearly every large city, as well as many smaller ones, constructive efforts are being made to solve it. Manufacturers themselves have been among the first to see the menace of the situation. Thousands of them are investing money in projects for the erection of more homes.

Better housing is being considered by business men chiefly as a business proposition rather than as a humanitarian move. It is believed that with more comfortable home conditions workers will be more contented and less easy prey for radical agitators preaching the rule of the proletariat.

AUTOMOTIVE INDUSTRIES presents herewith summaries from its correspondents of conditions in a score of cities, and means taken to ease the tension.

## St. Louis Will Erect Low Price Dwellings

ST. LOUIS, April 24—A \$2,000,000 Home and Housing Association has broken ground for the first of the homes it will build for workingmen. This is St. Louis' way of meeting the housing problem, made greater by the building of the Buick and Chevrolet plants of the General Motors Co. and other industrial enterprises now being completed in what is known as the General Motors district at Union and Natural Bridge avenues.

More than \$1,000,000 of the stock has been subscribed by business men of St. Louis. The association will build 200 homes this year. The cost of the buildings will run from \$4,000 to \$6,000, depending on the location and number of rooms. Purchasers are required to pay 10 per cent of the purchase price of the home when the deed to the property is turned over to him, and then make monthly payments on the balance.

### SPRINGFIELD SEEKS RELIEF

SPRINGFIELD, MASS., April 23—Attempts are being made here to form a \$1,000,000 home building corporation. The plan contemplated is for the manufacturers to subscribe half this amount and the other business men the remainder. The funds would be used to buy land and erect small single houses.

## New York Proposes \$30,000,000 for Homes

NEW YORK, April 24—A proposal to build \$30,000,000 worth of homes which could be leased from New York City has met with favorable consideration of the members of the New York Board of Estimate. The proposal was made by Edward P. Doyle, chairman of the budget committee of the Real Estate Board of New York.

Doyle offers to start the undertaking on Staten Island, where he said there were available any number of lots that had come into the possession of the city through tax lien foreclosures.

## Border Cities Building Thousand Residences

WINDSOR, April 23—One thousand homes of all sizes and prices will be erected in the border cities—Windsor, Walkerville, Sandwich and Ford City—this year, according to plans being formulated by the Border Chamber of Commerce, the city council and different manufacturers.

The actual cost will be about \$5,000,000, of which Windsor will provide \$2,000,000 for 500 houses, Walkerville \$1,500,000 for 300 houses, Ford City \$500,000 for 100 houses and Ojibway \$500,000 for 100 houses.

A company known as the Border Housing Co. has been formed, of which Hiram Walker of Walkerville is a member, and composed of officials of the larger manufacturing plants, members of the Chamber of Commerce and any one else who is interested in housing. The manufacturing plants will contribute to the building of houses according to their needs.

Major B. W. Vallat, general manager of the Dominion Forge & Stamping Co., one of the largest plants along the Essex border, also is behind the plan and says that his company will welcome any means to provide more houses for its employees.

All of the manufacturers are loath to go into the housing business themselves because of the experience of the General Motors Corp. and other large companies in like ventures in the United States.

### WILL AID WORKERS

PITTSBURGH, April 19—Important industrial corporations in the Pittsburgh district are financing home building operations by their employees to relieve the house shortage in mill and mining communities. For the general public, trust companies have adopted similar plans.

## Cleveland Business Men to Build Homes

### Back Company Which Will Erect Homes for Workers on Easy Payments

CLEVELAND, April 24—Cleveland automobile manufacturers and employers of labor making automobile parts have been given the opportunity to invest in an employers' co-operative company that has been formed by the Cleveland Chamber of Commerce to relieve the housing shortage.

The co-operative company is known as the Cleveland Housing Co. The capital is \$1,000,000. Shares of stock sell at \$100 each. All stock is common and none of it is sold to workers for the reason that all of their funds are to be held to make the first payments on homes. From 10 to 15 per cent of the cost of a home will be accepted from the worker as first payment and the balance may be paid as rent.

The Willard Storage Battery Co. was one of the first concerns in Cleveland to invest in the company. The National Acme Co., which makes automobile parts, is another heavy investor. The Torben-son Axle Co., the Chandler Motor Car Co. and the Jordan Motor Car Co. have the proposition of investing under consideration.

Homes will be allotted workers in a factory in proportion to the amount of stock held in the company by the factory owners. The first homes of the housing company will be started within two weeks, according to Bainbridge Cowell, manager. It is proposed to build from 200 to 300 houses for workers this year.

The housing company was first suggested to serve as a financing corporation for workers who desired to own their own homes. Later it was found that the company should undertake the building of residences this year, on account of the acute shortage of suitable places in which to live. The shortage is 15,000 homes.

Cleveland automobile manufacturers look with favor on the movement, because they feel that the housing shortage is largely responsible for industrial unrest, and an unusually large labor turnover.

### 500 HOMES ARE NEEDED

GREENFIELD, MASS., April 22—With a population of less than 20,000, fully 500 houses are needed here. The Greenfield Home Corp., formed last January with a capital of \$250,000, has begun work on 100 dwellings, for which material has been obtained. These houses will be sold for 10 per cent down.



# Stock Corporations Are Formed To Sell Workers Houses at Cost

## Milwaukee To Sell on Installment Plan

**Manufacturers Decide to Defer  
Plant Expansion Until Shelter  
Is Provided**

MILWAUKEE, April 22—To obviate hindrance to the rapid but substantial development of Milwaukee as one of the greatest producing centers of the automotive parts industry in the United States, the new administration of the rejuvenated Milwaukee Association of Commerce has taken steps to relieve the acute housing shortage by the formation of a concern with a capital stock of \$1,500,000, financed by leading manufacturers and other employers, to build at once 100 dwellings as the start of an enormous home building enterprise.

Articles of incorporation were filed during the week in behalf of the Association of Commerce Housing Corp., the outgrowth of the work of the special committee on housing created when Walter C. Carlson took office as president of the association March 1. Officers of the housing corporation are: President, C. Raymond Messenger, of Sivy Steel Co. and Chain Belt Co.; first vice-president and manager, Martin J. Shenners, real estate; second vice-president, J. William Peterson, of Richardson-Phenix Co., makers of lubricators; secretary, M. R. Hunter; treasurer, E. J. Kearney, of Kearney & Trecker Co., makers of milling machines. The directors include Walter Davidson, president Harley-Davidson Motor Co.; Harold H. Seaman, of Seaman Body Corp., and other prominent manufacturers identified with the automotive industries.

Plans and specifications for types of houses to be constructed and sold virtually at cost have been prepared and bids are being taken for the construction of the first lot of 100 homes. The corporation will begin this week to accept requests for houses, which will be filled in the order of receipt.

The Garden Homes Co., a \$500,000 corporation, also has been organized by members of the city land commission, a quasi-municipal body, to build workmen's dwellings on an extensive scale. Several other large private home construction projects have been launched as well.

### HOUSES CUT AS UNITS

DALLAS, TEX., April 20—About 200 public spirited men subscribed \$150,000 to establish the Dallas Housing Co. This body proposes to begin with 120 homes. To facilitate erection the largest saw mills in the Southwest have been employed to cut each house as a unit and deliver it on a car by itself.

## Senate Committee to Study Home Needs

WASHINGTON, April 24—Senator Calder of New York has introduced a resolution providing for the appointment of a committee of five senators to inquire into the housing situation and report to the Senate not later than Dec. 1 on:

(a) The existing situation in relation to the general construction of houses, manufacturing establishments and buildings, and the effect thereof upon other industries and upon the public welfare; and

(b) Such measures as it may deem necessary to stimulate and encourage popular investment rather than spending, to foster private initiative in building and to insure co-operation between labor and persons or corporations engaged in transportation, banking, or other business necessary to the development of such construction.

## Cincinnati Proposes Standardized Houses

CINCINNATI, April 24—Faced by a shortage of 4500 homes in Cincinnati, the Better Housing League, co-operating with Cincinnati manufacturers, is preparing to form a \$1,000,000 corporation to build homes to meet this shortage, without profit.

A thorough survey is being made now of the 60,000 industrial workers here to determine their exact needs and the type of house they are willing to buy, cash or time, or to rent. Homes will be built at minimum of cost in four standard types to meet desires of workmen, as shown by the survey, in the belief that this will do as much as anything else to relieve industrial unrest.

A new syndicate has purchased tracts of unimproved land with the announced intention of building salesrooms or buildings for firms seeking quarters. The first building will be one of the largest automobile salesrooms in the city, with 30,000 feet of space, for the Nash-Cincinnati Motors Co., wholesale and retail divisions.

### POUGHKEEPSIE IS AWAKE

POUGHKEEPSIE, N. Y., April 24—Each manufacturer here who joined the housing corporation which has been formed paid in \$25 for each employee. The total raised in this way was \$400,000 and other business interests subscribed an equal amount. The fund is being used for second mortgage loans to any one who desires to build.

## Indianapolis Strives to Meet Big Problem

**Needs 10,000 New Houses to  
Shelter Rapidly Increasing  
Population**

INDIANAPOLIS, April 24—Indianapolis is trying to meet its housing difficulty immediately and intelligently. The housing survey of the Indianapolis Chamber of Commerce showed conclusively that Indianapolis was in need of 10,000 new homes to take care of the population which, according to unofficial figures, is increasing at the rate of more than 100 daily.

The Chamber of Commerce is carrying on a drive for a larger Indianapolis industrially and is offering inducements for concerns to locate here, but is recognizing that if there is any pull to the appeal housing conditions must be met.

Rents are on the increase. Property is selling at extravagantly high prices, bought in many instances by tenants who either face purchase or eviction. The Chamber of Commerce says that these conditions make for social unrest, and, through its own forces, the banks, the building associations and the Real Estate Board, efforts are being made to build houses for the increasing population. There is much theory about the ideas. The only practical plans undertaken are those of the La Fayette Building Co., capitalized at \$1,000,000, half common and half preferred, financed by La Fayette Motors Co. interests and Indianapolis business men, and the Prest-O-Lite Co. plan of building homes for its employees near its plant to avoid the distressingly big labor turnover.

## Mortgage Loan Plan Taken Up in Buffalo

BUFFALO, April 24—Though the housing problem is not believed to be as acute here as in other cities, and while the unrest evident in this city is attributed more to the excessive cost of food and clothing than to scarcity of shelter, the fact remains that Buffalo could use at the present time from 3500 to 4000 more houses than the city has.

Realizing this need, and foreseeing a more serious housing situation in the future, it being conservatively estimated that 40,000 workers will come to Buffalo to live within the coming year, Mayor George S. Buck has just appointed a committee of nine representative citizens, which, it is believed, will resolve itself into a second mortgage loan organization, which will make it possible for many to build homes inasmuch as they will also

(Continued on page 1042)

# Ford Stores Cut Thousands From Employees' Living Costs

Sales of \$10,000 in One Day Represent Saving to Workers of  
Approximately \$2,000—Ford Flour Mills  
to Cut Costs Further

DETROIT, April 24—Cost of living for the 80,000 employees of the Ford Motor Co. has been materially reduced since the company established huge stores on Manchester Avenue, at which practically everything the workers need can be purchased at prices ranging from 20 per cent to 40 per cent less than those charged in the city shops. From underwear to overcoat and from shoes to top hat everything to outfit a man for his daily labor, for his semi-dress or for his banquet attire is to be found in the Ford store and at a price that is unheard of in the independent shops.

Henry Ford's latest venture is the construction of a huge flour mill at River Rouge, where the wheat raised on his own farm in sufficient quantity to feed all of his employees, is milled. Already sacks bearing the trademark "Ford Flour" are seen along the streets of Highland Park being carried or hauled to homes of residents.

Not only in the matter of clothing, food and shoes has he become active, but the establishment of a well equipped drug store, where drugs and druggist sundries may be found, is a part of the system. Then, too, the welfare efforts include a laundry, a hospital, a health and safety department, a dental office and laboratory, a motion picture studio, park and athletic field, bank and auditorium, educational and legal department, a home and rental exchange.

In the grocery store is included a meat market, where heretofore activities have been confined to the sale of bacon, hams and packed meats. A short time ago, however, plans were completed for handling fresh meats and to-day the white-aproned butchers in the Ford shop will serve the patron with a tender cut of roast or a loin of pork at from 10 to 20 cents less per pound than is possible to be secured in the city shops. The meat department is equipped with a refrigeration plant that is the last word in efficiency.

## Comparison of prices in Ford and outside stores to-day show:

	FORD	OTHERS
Butter .....	.68	.87
Eggs (best) .....	.46	.60
Flour (1/2-bbl.) .....	1.65	2.10
Beans (10 lbs.) .....	.66	1.00
Cream Cheese .....	.33	.60
Drug Prices		
Peroxide (1 pt.) .....	.14	.75
Aspirin (per 100) .....	.16	1.25
Shoes		
Shoes and Oxfords .....	10.00	16.00
Meats		
Bacon .....	.35-.53	.55-.68
Lard (2 lbs.) .....	.60	.70

Ford's commercial activities started in December in what the manufacturer terms a "hole in the wall" in one corner of the plant, when he established a dry grocery. In a week it had proved so successful as to prompt him to branch out and the employees in charge of the

store were given carte-blanc to fit out the grocery to compare favorably with any in Detroit.

The plan went across big and one by one other branches were added. January 3 a tailor shop was installed in charge of two tailors, who had made a success of their individual business. The shop quickly proved as much of a success as the other ventures, the only handicap lying in the fact that the majority of employees objected to the delay necessary in having a suit made to order. This resulted in the determination to establish a ready-made store, which will be opened May 1 with a full line of clothing, hats and men's furnishings.

Some idea of the business being done may be grasped when it is stated that in the grocery, drug and clothing store on Saturday, April 10, the business totalled \$10,000, a saving of approximately \$2,000 to the employees. In the shoe store the sale of 250 pairs is considered a fair day's business.

The Ford stores are opened at 7 o'clock in the morning and remain open until 9 o'clock at night. This is for the purpose of giving employees of the three 8-hour shifts an opportunity to do their purchasing. Branches have been opened at the Dearborn tractor plant and also at River Rouge. The business in the main stores and the branches is increasing daily and the furnishing of additional store space will be continued as rapidly as buildings can be remodeled or reconstructed.

In the shoe store the employee or an outside individual may secure shoes for any service at prices ranging from \$2.79 for working shoes to \$10 for the stylish shoes that, as a rule, are found in the downtown stores selling for from \$14 to \$18. Thirty styles of shoes are included in the stock, and as evidence of their quality and style practically every official of the Ford Motor Co. is wearing shoes from the Ford stores, for which they paid from \$6 to \$10. The men find they wear and look like a million.

## Separate Staff for Stores

Established with the view simply to help the employees cut living costs and lay by a little for the future, and not with the idea of competition or stifling trade in the independent stores, the venture has become so big as to require the entire time of at least two of the Ford executives. Under these men is a staff of employees, whose working conditions are the same as are maintained in the factory insofar as wages, salaries and bonuses are concerned.

A staff of buyers is kept on the road looking for bargains in the commodities needed in the Ford stores. Everything is bought in carload lots and paid for in cash, the cash discount adding materially to the price reduction to the consumer. Only a profit sufficient to cover the actual cost of handling is asked of the consumer.

Pending completion of the big flour mill at River Rouge, Ford has purchased a mill at Adrian, where he is grinding wheat from his farm.

## One of the Ford Stores at a Shift Hour



Five clerks are shown issuing forth provisions under the eye of a store director. Looks like a run on the bank, but it has a directly opposite effect



## Pan Motors to Sell \$2,000,000 in Stock

### Minnesota Commission Authorizes Issue But Stipulates No Sales in That State

MINNEAPOLIS, April 24.—The Minnesota State Securities Commission will license the sale of \$2,000,000 worth of Pan Motor Co. stock when the company files an amendment adopted by the stockholders authorizing the issuance of the securities. It is stipulated that the cost of selling must not exceed 15 per cent of the sale price. The proceeds must be used for manufacturing and working capital.

The company is backed by responsible business men of St. Cloud. Samuel C. Pandolfo is barred from participating in the sale. Disposal of common stock in Minnesota has been prohibited. The security authorized is first preferred 8 per cent cumulative, participating, voting, at \$10 par, retireable at fixed periods in stated amounts after five years, at par.

Pandolfo, former president of the company, was sentenced by Federal Judge Landis in Chicago on Dec. 16 to serve ten years in prison for using the mails to defraud in the sale of stock. His attorneys appealed and he was released on bail pending determination of the appeal.

Conviction of Pandolfo marked the closing chapter in what was characterized by the authorities as an astounding advertising fraud. The national vigilance committee of the Associated Advertising Clubs of the World first called attention to Pandolfo's operations. It was alleged he received for his services as fiscal agent half of all the money subscribed for stock. A special appeal to holders of Liberty bonds resulted in nearly \$1,000,000 being paid in through them.

After Pandolfo's conviction the company was entirely reorganized and its affairs now are in the hands of reputable St. Cloud citizens.

### BELGIAN GLASS IN PRODUCTION

NEW YORK, April 24.—The Belgian glass industry has so far recovered from the effects of the war, according to trade reports here, that eighteen ovens have gotten into operation, each turning out some 1,800,000 to 2,000,000 sq. ft. of glass monthly. Numerous orders are being refused, it is stated, and nearly nine-tenths of the output is being exported. Several additional ovens will be opened as soon as more coal becomes available, fuel apparently being the limiting factor in the glass production.

### 4256 FORDS MADE IN DAY

DETROIT, April 23.—Ford Motor Co. established a record for one day when on March 27 4256 cars and trucks left the factory. The nearest approach to this record was on a day in May, 1917, when 3868 cars and trucks were turned out. Of the total turned out March 27,

3756 were cars and 500 trucks. Up to the time the power ban was placed on the factory as the result of the strike, the company's production record, while never able again to reach that day's figure, hovered around the 3500 mark. Despite this enormous output, Detroit dealers and those in territory within 200 miles of this city have sold their allotments, and delivery of new Fords cannot be promised before fall.

### Miller Employees to Get Summer Vacations

AKRON, April 24.—Non-salaried employees of the Miller Rubber Co., which employs 6,000 persons, will be given vacations this summer, the length of the rest period depending upon the term of service with the company. Employees on salary will continue to get vacations, but this granting of rest periods to non-salaried workers is an innovation.

Miller factory employees who have been in the employ of the company from two to three years will be given five working days' vacation. Those who have been three years or more with the company get 10 days off with pay. Vacation pay for day workers will be based upon the standard number of working hours per week at the average hourly rate. Piece workers' pay will be based upon the average piece work earnings per hour for one month preceding the vacation.

### Tokyo to Assemble 300 Cars Monthly

NEW YORK, April 27.—Announcement was made here to-day that an assembling plant that will have a capacity of approximately 300 cars per month was in course of construction at Tokyo, Japan, by Sale & Frazar, the Japanese agents for Frazar & Co., of New York, which handles the Far East export for Ford, Hupmobile and Franklin passenger cars, Fordson tractors and White trucks. The new station will be in addition to that at present maintained at Yokohama, which will be continued. Shipments from this country to Japan have been assembled at Yokohama and driven overland to Tokyo.

### N. A. C. C. AT GRAND CENTRAL

NEW YORK, April 24.—The National Automobile Chamber of Commerce moved this week to its temporary quarters on the fourth floor of the Grand Central Palace where it will remain about two months. When the Marlin-Rockwell building at Madison Avenue and Forty-sixth Street is completed, probably by July 1, the Chamber will be located there permanently. The organization functioned perfectly through the moving operations and did not slip a cog.

### "TURMO," NEW ENGINE TITLE

DETROIT, April 24.—The trade name "Turmo" has been given by the Turner Moore Manufacturing Co. to its line of engines.

## Deny Vanadium to Head Big Merger

### Reports of Great Combination With Automobile Interests Discredited by Replogle

NEW YORK, April 22.—Reports that the Vanadium Corp. of America was to be the cornerstone of a great combination of automobile and allied companies were denied to-day by J. Leonard Replogle, president. The steel company is not for sale, he declared, although he said he had been approached recently by "two very large banks" with offers to buy. He declined to intimate the interests which the banks represented. It is not clear, therefore, whether they were acting for persons back of a great automobile merger of which many rumors have been heard of late.

Replogle said it was his desire to bring Vanadium steel to its highest point of development before he relinquishes the helm and that this development would take some time, for the corporation is still almost in its infancy. He added that it would be folly for the large owners of its stock to dispose of their holdings now when Federal taxes would consume a large part of the proceeds.

Reports have coupled the name of Allan A. Ryan with the merger said to be contemplated, but Replogle said Ryan owns a comparatively small interest in Vanadium. Charles M. Schwab, who has been associated in business with Ryan, is a large stockholder in the steel company, but Replogle's holdings are four times as large as those of any other individual, he said.

An effort to obtain a statement from Ryan in reference to the consolidation rumors was without avail. Various interests with which he is closely associated have been mentioned in connection with it. These include Stutz Motor Car Co. and Stromberg Carburetor as well as Vanadium.

### Mine Railroad Nearly Ready

Replogle said he had received a cable message from Peru this week announcing that shipments of ore were larger this month than ever before in the history of the company. Rapid progress is being made by the Foundation Co. in building the railroad which will bring the ore down to Lake Punrun. The mines are 16,800 feet above sea level and the railroad will be 12 miles long.

It was explained by Replogle that when the railroad is completed there will be an immediate speeding up in shipments and this is expected in August or September. The ore now is transported down the mountain on the backs of llamas, the Andes beast of burden.

"What we are trying to do is to supply the automobile industry in this country," he said. "We are cutting down on shipments abroad and discouraging new uses for Vanadium at present. Domestic demand will be met first although we have heavy calls for our products from abroad."

## Makers to Consider Dealer Advertising

Part to Be Assumed Will Be Discussed at Cleveland Meeting in May

NEW YORK, April 24.—The executive committee of the Advertising Managers' Council of the Motor and Accessory Manufacturers' Association has called a meeting of the entire council to be held at the Hotel Cleveland, Cleveland, May 7 and 8. Problems vitally affecting the automobile industry generally, as well as the individual members, will be discussed.

One of the central topics will be the manufacturers' advertising problems in relation to the dealer. It will be considered by S. E. Baldwin, advertising manager of the Willard Storage Battery Co., Cleveland, whose subject will be, "What Proportion of the Dealers' Advertising, If Any, Should the Manufacturer Pay?"

"The Part Advertising Has Played in the Development of the Automobile Industry" will be discussed by E. C. Tibbitts, advertising manager of the B. F. Goodrich Co. This paper will point out the need for closer co-operation between the car manufacturer and the parts and equipment makers.

### WESTCOTT EXTENDS PLANT

SPRINGFIELD, O., April 24.—The Westcott Motor Car Co. has completed a new building at its plant 125 x 250 ft. in size, which will permit a greater output. The new structure is used as a warehouse and facilities thus provided will release for manufacturing purposes large sections of the main factory buildings which it has been necessary to use for storage purposes. Additional machinery and equipment have been installed, including a new set of electric ovens for the painting department.

### MOTO-METER SUES STEARNS

NEW YORK, April 24.—The Moto-Meter Co., Inc., Long Island City, and Harrison H. Boyce have filed suit in Federal Court, Northern District of Ohio, against the F. B. Stearns Co. alleging infringement of the Moto-Meter patent, No. 1,275,654, filed in 1912. It is claimed the infringement is on a device called the Motor Eye. An injunction and damages are asked.

### BUFFALO PROPOSES BOAT SHOW

BUFFALO, April 24.—There is talk here of arranging a permanent motor boat show at a centrally located point. Since the early days of motor boating Buffalo has been an important center. Many of the leading engine and accessory plants are located here, and recently a California engine manufacturer established its Eastern branch here.

The question of location for a permanent exhibition has been discussed, and many believe that the Associated Service

Building answers the requirements ideally. This is a comparatively new institution to provide display and sales space for manufacturers of all kinds of products. The building has 175,000 sq. ft. of floor space, now partly occupied by 400 manufacturers, and is a show place visited by hundreds daily. With a permanent showing of boats, builders believe a decided impetus would be given the industry.

## Stutz Proposes Stock Increase of \$400,000

NEW YORK, April 26.—A call has been issued for a special meeting of stockholders of the Stutz Motor Car Co. of America, Inc., at the offices in this city on May 5 to vote on a proposal to increase the number of shares from 120,000 to 200,000, both without par value. They also will be asked to determine the additional amount of capital with which the business of the company will be conducted if the increase is authorized.

If this proposal is adopted, the shareholders will be asked furthermore to consent to the issuance of 80,000 additional shares at \$5 a share by the transfer of \$400,000 from the surplus to the capital account. These 80,000 shares are to be distributed as a stock dividend on a pro rata basis on the following dates, 20,000 shares on July 8, 1920, to stockholders of record June 15; the same amount on October 8, 1920, to holders of record September 15 and another 20,000 shares on Jan. 7, 1921, to holders of record December 15, 1920, and the final 20,000 shares on April 8 to holders of record March 15.

### EAGLE BUYS STERLING PLANT

BROCKTON, April 24.—A large part of the plant of the Sterling Motor Car Co. is to be used now that the Eagle Motorcycle Co. of this city has been newly incorporated. Papers have just been filed at the State House. The capital is \$500,000 and the company is organized for the manufacture of motorcycles in Brockton. Ernest R. Smith of this city is one of the incorporators and is associated with Emanuel Kuhn and Benjamin Kaufman, both of Allston.

### CLOSED CARS IN DEMAND

SYRACUSE, N. Y., April 24.—An unusually heavy demand for enclosed cars is shown by the present unfilled orders for 4042 on hand by the Franklin Automobile Co. More than half is for the sedan model. The present Franklin production is announced at 60 machines daily, with the schedule calling for 16,000 cars this year. The scheduled number next year is 25,000.

### GRAY-DORT BUYS CAMPBELL

FLINT, MICH., April 24.—The Gray-Dort Co. of Chatham, Ont., has acquired the plant of the William Gray's Son-Campbell Co., Ltd., as an addition to the Canadian factory.

## Would Eliminate "Factory" Missionary

Sales Manager Tells Jobbers to Reduce Distribution Cost by Sales Efforts

NEW YORK, April 26.—Elimination of the factory "missionary salesman" as a wasteful factor in the distribution of automotive equipment was advocated by W. S. Isherwood, sales manager of the Champion Ignition Co., in an address here to-day before the Eastern Automotive Equipment Association. Isherwood, whose remarks were seconded in a discussion participated in by several members of the association, declared that maintenance of the traveling factory salesman was a considerable tax upon the cost of distribution and that it resulted too often in selling the retailer the mechanical side of the goods instead of the opportunity for profit.

Contending that the missionary man had performed a certain service for the industry in bringing about marketing of products in territories which were underdeveloped from a merchandising standpoint, Isherwood asserted that jobbers should undertake more intensive efforts in developing retail organizations, particularly in the small towns. Jobbers, he said, must have salesmen who will not balk at covering the "bowl and pitcher" routes. Work along this line, he declared, would build jobbers' business in the way it should go and result in the withdrawal of the factory traveling man as unnecessary.

Jobbers who replied to Isherwood agreed with him regarding the wisdom of eliminating the missionary man at the earliest possible opportunity, but several were doubtful of the ability of jobbers, in view of accompanying profits, to go extensively into small town districts, particularly if manufacturers were to continue the policy of giving discounts to the larger retailers in such districts, these retailers in turn to pass on goods on a semi-jobbing basis to smaller dealers and garagemen. Almost unanimously they blamed the factory salesmen for a considerable percentage of returned goods sold for them by the factory man, stating that the latter too often tried to make a personal record in sales and overloaded the retailer.

### Jobbers Need Efficiency Methods

Isherwood retorted that there was general need of greater jobber efficiency, pointing out that the missionary man largely was an instrument to go out and sell goods for the jobber who fails to do the work for himself, an agency to convince jobbers of their own merchandising opportunities.

John T. Galvin, president of the Metal Stamping Co., told the jobbers the shortage of bumpers was due to delays, through steel factory and freight conditions, in the receipt of materials.

The association, which is affiliated with the Automotive Equipment Association, has fifty-eight members.



## Economy Assembly Gray Motors Plan

Branches in Ten Cities Will Put  
Cars Together to Save  
Freight

DETROIT, April 26—The Gray Motor Co. has been purchased by a syndicate of Detroit men and reorganized as the Gray Motor Corp. The stock of the new concern has been underwritten by New York and Chicago bankers. The present manufacturing units will be continued and new ones added by the corporation, which enters business with a cash capital of \$2,500,000.

The president and general manager of the Gray Motor Corp. is F. F. Beall, who has been vice-president of the Packard Motor Car Co. in charge of manufacturing for the past seven years. William H. Blackburn, superintendent of the Cadillac company for several years, is to be factory manager. The Benjamin Briscoe & Stahl Engineering Co. are the engineers.

The Gray Motor Corp. has made contracts with other parts manufacturers and in combination with these companies will produce all the major units for the new car which has been designed and developed by the Briscoe & Stahl company in the last year.

The business of the Gray corporation will be to finance, warehouse and manufacture all the component parts of a standard up-to-the-minute car, but it will be shipped in unassembled form to affiliated assembling companies at points best suited for economical distribution. There will be at least ten of these assembling and distributing companies in the United States and others will be established in the principal cities of the world. Companies are now being organized in Detroit and Chicago.

The Gray Motor Corp. also has obtained the manufacturing rights of the Briscoe, Storey & Stahl knocked down automobile body. It is believed that by shipping the parts of a moderate priced car in knocked-down form many traffic difficulties will be overcome and that there will be a large saving in freight charges.

### 418,000 HUBS IN MARCH

ALBION, MICH., April 16—Hayes Wheel Co.'s hub plant in this city rapidly is taking rank as one of the big industries of the state. The output during March was 418,000 hubs, an increase of 65,000 over production for the same month a year ago. The 1919 output at the local plant was in excess of 4,000,000 hubs.

### FORM NEW TRUCK COMPANY

WALKERVILLE, ONT., April 24—Benjamin Gotfredson, president, and Frank J. Joyce, secretary and treasurer of the American Auto Trimming Co., have formed the Gotfredson-Joyce Corp., Ltd., to manufacture trucks. They have taken over the Gramm plant at Walker-

ville and are at present remodeling it, with the expectation of starting operations by about the end of April or the first week in May. The products of the factory for the present will be confined to 2½-ton trucks, of an approved model which has been in service and tested for the past six or eight months. The company expects to produce at least one thousand during the coming year.

## Government Seeks Buyer for Airdrome

LONDON, April 10—(*Special Correspondence*)—The American Airdrome at Eastleigh, near Southampton, Hants, is for sale, and it is reported that the United States Government authorities are trying to interest Henry Ford in its suitability for a proposed Ford car works in England. The area is over 250 acres, and there are several large buildings ready for use, as well as stores and railroad facilities.

Before the war it was understood that Ford works would be built at Southampton, which is close to Eastleigh, but the scheme was set aside in favor of extensions of the Manchester Ford works. The latter as buildings do not compare with the war buildings now available, but had much to recommend them at the time Ford acquired them, on the score of size, cheapness and proximity to the Ship Canal at Manchester, with its facilities for direct transfer into store of parts shipped from Detroit.

The decision of the Ford company to build its cars and trucks almost wholly for the British and Colonial market in England, of course, has altered the outlook as regards the Manchester works and their suitability for the new program. It was stated awhile back that the Ford interests would spend \$5,000,000 on its English production scheme.

### CURTISS RESUMES OPERATIONS

NEW YORK, April 24.—With the opening of the flying season, the Curtiss Aeroplane & Motor Corp. has resumed flying operations at Garden City, Buffalo and Atlantic City. The Curtiss school will be located at Garden City and will again be in charge of Richard H. Depew, Jr. Courses will be given in motor and plane construction and in repair and theoretical courses in elementary aerodynamics, cross country flying, instrument reading, etc.

### BOSCH OFFERS RACE PRIZE

SPRINGFIELD, MASS., April 26.—The American Bosch Magneto Corp. will offer a cash prize of \$3,000 to the driver who wins first place in the 500-mile International Sweepstakes at Indianapolis on May 31. There will also be a second prize of \$500 and a third of \$250.

The only condition governing the awarding of the prizes is that the driver in each instance shall have used a Bosch magneto for ignition purposes. The purpose of the prizes is to focus attention upon the ignition question.

## Sterling to Build 6-cylinder Knight

Stearns' Engineer Forms New  
Company to Make Car in  
Cleveland

CLEVELAND, April 24—J. G. Sterling for many years chief engineer of the F. B. Stearns Co., manufacturers of the Stearns-Knight motor car, has resigned his position with the Stearns company to head a company that will manufacture a 6-cylinder Knight motor car.

Sterling, who has associated with him P. H. Worthington and several well-known automobile men and capitalists in a temporary syndicate, has begun the development of the new motor. An adequate machine shop has been purchased in Cleveland for building the first experimental car and the new development is being pushed as rapidly as possible.

Sterling has secured his license to manufacture under the Knight patent. The plan for the financing of the new company has been worked out, the details of which will be announced soon. The company has secured a desirable site in Cleveland for its proposed new plant.

### JOIN EQUIPMENT ASSOCIATION

CHICAGO, April 24.—Twelve manufacturing firms have been added to the list of members of the Automotive Equipment Association. The new members are: American Bureau of Engineering, Inc., Chicago; Alvord Reamer & Tool Co., Millersburg, Pa.; Apex Electric Manufacturing Co., Chicago; the Carborundum Co., Niagara Falls; Conant & Donelson, Conway, Mass.; Federal Brass Co., Chicago; Gill Manufacturing Co., Chicago; National Lamp Works of General Electric Co., Cleveland; Neville Steering Wheel & Mfg. Co., Detroit; Presto-Felt Mfg. Co., Toledo; Stewart Mfg. Corp., Chicago, and Stewart Mfg. Co., Oakland, Cal.

### SPICER ACQUIRES SALISBURY

WORCESTER, April 24.—Control of the Salisbury Axle Co., one of the oldest manufacturers of axles for motor cars, has been acquired by the Spicer Manufacturing Corp. Spicer officials have contracted to purchase the entire 20,000 shares of common stock of the Salisbury company outstanding.

### PIERCE RETAINS DIRECTORS

BUFFALO, April 24.—Directors of the Pierce-Arrow Motor Car Co. were re-elected at the annual meeting here. The vacancy caused by the death of Charles H. McCulloch, late president of the Lackawanna Steel Co. was not filled.

When asked if any action had been taken relative to the acquisition of the company by the General Motors Corp. the chairman of the meeting replied:

"Our answer to that is that we elected the old board of directors."

## Wildman to Build Plant at Bay City

New Tire Company Will Have  
Production of 7500 Tires  
and Tubes Daily

DETROIT, April 22—Wildman Rubber Co., headed by W. W. Wildman, has been organized in Detroit and has taken over a tract of 60 acres in Bay City, where its \$2,500,000 plant is contemplated. The site for the new plant was given by the Board of Commerce of Bay City on the company's agreement to erect the first unit of its plant at an expenditure of \$1,000,000 within 18 months.

Wildman, who formerly was president of the Portage Rubber Co., and who formed that company as the outgrowth of the old United Rubber Co., said to-day the company would break ground for the Bay City factory within 90 days. A total of \$500,000 will be spent within the year, he said, and the agreed \$1,000,000 will have been invested in plant building and equipment within the 18 months specified. The company contemplates a production of 2500 tires and 5000 tubes a day, and the first unit will give employment to 1500 men.

With a capital of \$10,000,000 in 7 per cent preferred of the par value of \$100, and 100,000 shares of no par common, the company is placing on the market two shares of preferred and one of common for \$250. The company is incorporated under the Delaware laws, and the securities commissions of Michigan and Ohio have passed favorably on the stock issue. L. C. MacGregor, formerly Detroit branch manager for the Portage Rubber Co., and C. R. Twynham, for many years auditor and office manager of the Portage company, are officers of the new concern, the former vice-president and the latter secretary and

treasurer. A board of directors, including some of the big men in the automotive industry, is being formed.

Negotiations are now being completed for the purchase of a going tire concern at Akron by the new company, wherein the manufacture of tires and tubes will be started immediately.

Besides having been the founder and chief stockholder with his three brothers of the Portage, Wildman also was an organizer of the Federal Rubber Co.

## Firestone Scholarship for Good Roads Essay

AKRON, April 24—High school pupils of the country will be given an opportunity to compete for a four years' university scholarship for the best essay submitted in connection with Ship-by-Truck—Good Roads Week, May 17-22. The awards will be made by judges appointed by the Federal Bureau of Education. The national prize will be known as the H. S. Firestone University Scholarship and the winner may select any university or college. In addition prizes will be awarded in each community. The essays must be kept within 500 words.

The purpose of the contest is to arouse interest in good roads and the feasibility of the motor truck as a short haul medium.

## G. M. C. TRUCK STARTS PLANT

PONTIAC, MICH., April 24.—Work has been started on additions which will increase the capacity of the General Motors Truck Co., to 25,000 trucks in 1921. These additions will double the size of the plant, making it more than ten acres. Running along the south side of the property will be a railroad siding to facilitate the receipt of materials.

## Colt Predicts Tires Will Supplant Rails

Business of \$1,200,000,000 This  
Year Shows Trend, United  
States Head Says

NEW BRUNSWICK, N. J., April 24.—A "startling increase" in the future for the tire business was predicted by Col. Samuel P. Colt, president of the United States Rubber Co., in his report to the stockholders at their annual meeting here to-day. In his statement he said:

"The business of all departments of your company is growing beyond precedent and your directors are striving in all ways through new construction and extensions to keep pace with its growth.

"Few perhaps realize the part being played by the automobile, the auto truck and the auto 'bus in the transportation of both passengers and freight. Forty trucks left last week to carry tire fabrics from the cotton mills in Rhode Island to the tire mills in the West. All of these vehicles are equipped with rubber tires, which to-day is one of the chief products of the United States Rubber Co.

"With the improvements in the highways of our country that are rapidly being made (as an illustration, the great Lincoln Highway) traffic will be moved more and more by rubber-shod vehicles, and less and less by cars and trains over fixed iron tracks.

"The tire business of the country in 1914 was \$300,000,000, and in 1920 it is estimated it will be \$1,200,000,000. Notwithstanding this phenomenal growth, I predict even a more startling increase in the future.

"We see, therefore, these conditions confronting us and shall strive our utmost to be prepared to cope with them."

George R. Geshler of New Brunswick was elected a director to succeed temporarily Theodore N. Vail.

## S. A. E. TO HEAR HORINE

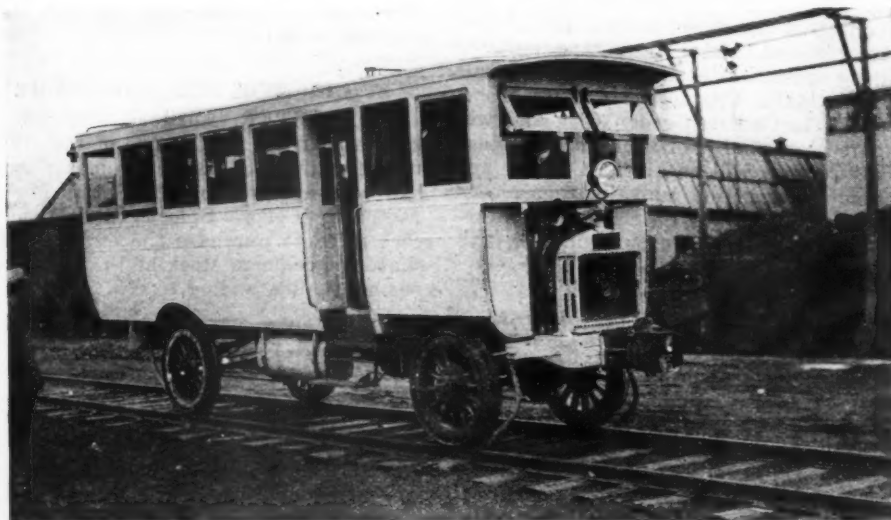
DETROIT, April 24.—Merrill C. Horine of the International Motor Co., formerly associate editor of Commercial Vehicle, will deliver a paper April 30 at the Detroit Section S. A. E. The subject of the paper will be, "A Study of Road Impact, Spring and Tire Deflection, etc." The studies are made by means of motion pictures and will be accompanied by a paper on the subject, taking up such matters as unsprung weight, spring suspension, tire deflection, etc.

## JAPAN BUYS J. V. B. ENGINES

AKRON, April 24.—The Motor Boat Co. of Tokyo, Japan, has placed an order with the J. V. B. Engine Co. for twelve of Joseph Van Blerck's new four-cylinder 40-60-hp. marine engines.

These engines will be installed in stock boats which the boat company is building. The standardization idea as applied to motor boats is meeting with popular favor throughout the world.

## Three-Ton Truck as Railroad Coach



*This F W D truck equipped with flanged wheels and a passenger carrying body is being used on the Palatine, Lake Zurich & Wauconda railroad on its 16-mile route in Illinois. The truck has a capacity for 80 passengers and hauls a trailer carrying 5 tons of freight and baggage. Without the trailer the round trip, 32 miles, is made on 6 gallons of gasoline*



## Motor Trucks Rank With Rail and Water

### Chamber of Commerce Gives Motors Equal Shipping Im- portance at Convention

ATLANTIC CITY, April 27.—Motor transportation, especially the truck, today was accorded a position equal to that of the railroad and the merchant marine in the Eighth Annual Meeting of the Chamber of Commerce of the United States. The introduction of the truck in this company took place in the general session on the subject "Transportation in Relation to Production." There were three subjects on the general program. George H. Graham, general sales manager of the Pierce-Arrow company, represented the truck, his subject being "Highways." He said in part:

"The advocates of highway traffic are proud to plead their cause from the same platform as their older brothers in transportation, the railways and the merchant marine. We have no thought to be their rivals. It is our aspiration to supplement them in the transportation trinity."

In reviewing the transportation situation Graham pointed out that the two established systems were overtaxed and the prospect of development was by a greater and more economical use of the highways. He called attention to the business complications brought on by the various transportation strikes and the aid rendered by the motor truck. Transportation must work equally with production.

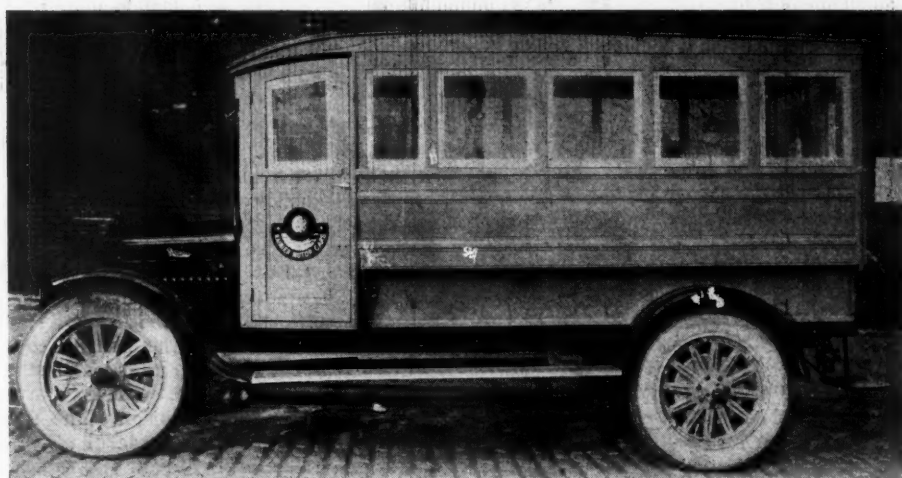
The passenger car had established itself and the truck is coming to that point, the greatest drawback so far being the failure to work it as a supplement to the railroads. Its future, he said, was as a feeder of steam transportation. The 3000 established rural motor express routes are proof of this value.

The other topics presented at the general session were: Railroads, by G. A. Post, president of the Standard Coupler Co.; Merchant Marine, presented by Admiral William L. Benson, B. F. Harris, a Chicago banker; Senator W. L. Jones of Washington, and John G. Pardee, president of the American Electric Railway Association.

In the group meeting, in the afternoon, the automotive speakers brought strongly to the attention of the assembled transportation men the utility of the motor truck in handling freight at terminals and for hauls shorter than those for which the freight car can be profitably used. Resolutions were adopted favoring national control of the highways.

#### WELDING SOCIETY MEETS

NEW YORK, April 26.—At the annual meeting of the American Welding Society, held April 22, plans were formed for closer co-operation with manufacturing companies to conduct extensive research work in the fields in which the society is interested. Officials of Baldwin Locomotive Works have offered their services in connection with the subject of



### Omnibus to Be Used in Palestine

*The streets of Jerusalem are soon to blossom forth with a fleet of buses to be operated there and between that city and Damascus in Syria by the Ramallah Company of Jerusalem and New York. The trucks are Rainiers with special bodies accommodating 25 passengers*

boiler welding, and other companies have made similar offers touching various phases of the society's research activity. The point was emphasized that at present there is no adequate method of determining whether a weld is good or bad, and that welds made by some of the best experts sometimes break down without apparent reason. J. H. Deppeler, of the Metal and Thermit Corp., was elected president of the society for the coming year, Prof. Comfort A. Adams of Harvard retiring.

### Christian Girl Buys Kalamazoo Company

DETROIT, April 26.—Christian Girl, former president of the Standard Parts Co., is heading a new company which has purchased the Kalamazoo Spring & Axle Co., Kalamazoo, Mich. The plant is to be remodeled and extended to manufacture automobile springs chiefly. Girl will be in direct charge of the new company.

Announcement of the purchase came as a surprise to Girl's friends in Detroit automotive circles. Details of the purchase are to be announced in a few days, but it is learned that Girl owns practically all of the stock in the acquiring company.

#### NO METRIC SYSTEM BILL

WASHINGTON, April 27.—The present Congress will not consider any bill to make the metric system of measurements compulsory in this country, according to a statement issued by Representative Vestal, chairman of the committee on coinage, weights and measures. This statement is made to clear up what appears to be a very general misunderstanding. Information has been given out that such a bill is pending and Vestal's committee is receiving many telegrams and letters on the subject, some favoring and others opposing such a move. Vestal asserts positively that no bill of this nature has been introduced.

## Little Motor Heads Held for Conspiracy

### Postal Authorities Allege Violation of Mail Law and Plan to Defraud

DALLAS, TEX., April 26.—Charged with violation of the postal laws and with conspiracy to defraud, five officials of the Little Motor Car Co. of Grand Prairie, Tex., were arrested here and lodged in jail after their failure to produce a bond of \$25,000 each. Those arrested were William S. Livezey, president; R. L. McCoy, vice-president; George W. Stricker, secretary, and J. H. Crew and Herman Stricker, stockholders.

Soon after the arrests were made attorneys for the defendants filed habeas corpus proceedings for reduction of the bonds, which were granted. Livezey's bond was reduced to \$15,000, McCoy's to \$7,500 and the bonds of the three others to \$5,000 each.

Federal officials say that stock has been sold by the Little Motor Car Co., to the amount of \$1,000,000, to stockholders numbering 30,000. It is claimed that the assets of the company are less than \$300,000. The company, they say, was organized a year ago with a capital stock of \$100,000 which was later increased to \$1,000,000 and then to \$3,000,000. The stock originally sold at \$1 a share, but later was raised to \$4.

The company had built one unit of a factory at Grand Prairie, one office building and seven or eight frame buildings.

#### S. A. E. RESERVES QUARTERS

NEW YORK, April 24.—Hotel room reservations for the summer meeting of the Society of Automotive Engineers at Ottawa Beach now number 364. The fund to provide prizes for the athletic contests has reached substantial proportions, now standing at \$1,650.

# Automobile Paper Banned by Bank

## Kansas City Federal Reserve Acts Alone

**Refuses Rediscount—Calls Passenger Cars Non-essential—Industry Aroused**

KANSAS CITY, April 26—The Federal Reserve Bank of Kansas City has decreed that passenger automobile paper is undesirable for rediscounting. In less than a week it has declined approximately \$3,000,000 of this class of credit. In the same period, however, other Kansas City banks loaned in excess of \$1,000,000 to motor car dealers and distributors while the banks in the territory of which this city is the center loaned probably as much more. The contention of the Federal Reserve Bank is that a large proportion of the passenger car production is non-essential.

Trucks have not come under the ban and the Reserve bank has decreed that "any paper based solely on trucks is acceptable." The exclusive truck dealer can get credit when the one who deals both in passenger cars and commercial vehicles cannot. The latter must depend solely on his own banker and the attitude of the Reserve bank is finding reflection in other institutions. That is the chief menace of the situation. State banks not connected with the Federal Reserve system, which hitherto have taken automobile paper without question, are becoming afraid of it.

The position of the Federal Reserve bank was thus expressed by Carroll A. Worthington, deputy governor:

"A certain percentage of passenger cars are bought and used for pleasure purposes. If it were possible to discriminate in favor of cars to be used for utility, the bank would do so and rediscount paper on cars to be so used. But this cannot be done, obviously, since the dealer doesn't know what use is to be made of the cars he is receiving. We do know that the passenger car industry is using an enormous amount of money and man-power at a time when money and man-power are urgently needed for essentials—such use by the motor industry tending to increase wages because of withdrawal of man-power from other essential production.

### Object to Maintenance Outlay

"We see right in Kansas City the enormous sums spent on motor cars—offering a definite objective for curtailment of spending. Some of this spending is essential, but we can't discriminate very well and so have to make the effort at curtailing the entire industry. There are 40,000 cars here and 30,000 of them perhaps are used for pleasure largely—an average maintenance of \$500 a year, or a total of \$15,000,000 a year."

A. B. Eisenhower, assistant cashier

of the National Bank of Commerce, who has kept in particularly close touch with the motor industry, said:

"Banks will continue to make loans on cars to dealers who have well established businesses and will protect their customers. But there will be curtailment. Fortunately, few cars are being received now, so that the issue is not well defined yet. But the next 30 days will probably show a marked decline in motor car business, unless a turn comes in the money situation. The most important effect of the Federal Reserve order is its moral effect on bankers, dealers, real estate men and the public. It seems to me that a mistaken impression is being created as to the utility of the motor car and that perhaps an unjust handicap may eventually be placed on the industry. This may partly be the fault of the industry itself and some of the elements involved in its financing."

(Continued on page 1037)

## New York Banks Find Automobile Paper Good

NEW YORK, April 26—The Federal Reserve Bank of New York said to-day that it still was rediscounting automobile paper and expected to continue doing so. While every effort is being made to confine credit to essentials there is no intention, so far as known now, to discriminate against passenger cars.

At a time of the year when Western banks usually are in a position to send money to New York, the Federal Reserve banks of Chicago, Minneapolis, St. Louis and Kansas City are borrowing more than \$58,000,000 while New York and Boston are loaning more than \$72,000,000. The basic reason for this unusual situation is believed to be that Western farmers are holding their wheat and other crops and that the banks are finding it necessary to finance them. The result is a corresponding curtailment of credit to other lines of business.

The attention of the National Automobile Chamber of Commerce and the National Automobile Dealers Association already has been called to this new menace to the industry in the Kansas City district.

It was said at the N. A. C. C. that a vigorous protest would be filed with the Kansas City bank in behalf of the entire industry and that representations would be made at Washington if there was any danger of the idea of classifying passenger cars as luxuries becoming epidemic.

Harry G. Moock, executive secretary of the National Automobile Dealers Association, telegraphed that investigation in St. Louis did not develop a situation similar to that in Kansas City, but that his organization was taking up with the Federal Reserve Board in Washington the curtailment of credit.

## Harding Says Stand Taken Not National

**Each District Can Use Discretion in Deciding What Paper Most Essential**

WASHINGTON, April 27—Action of the Kansas City Federal Reserve Bank in refusing to rediscount automobile paper and in characterizing the passenger car industry as largely non-essential does not reflect a national policy outlined by the Federal Reserve Board nor is it based upon any suggestion of the governing organization.

W. P. G. Harding, governor of the Reserve Board, told a representative of AUTOMOTIVE INDUSTRIES to-day that it is not the province of the board to determine the essentiality of an industry but merely the worth of its paper. He said, however, that it is proper for individual Federal banks to class certain paper as more or less essential in their districts. For example, he explained, farm paper would be more essential in Kansas and automobile paper in Detroit or Chicago.

The following statement on the subject was issued by the board:

"The Federal Reserve Board does not determine for the Federal Reserve Banks the desirability of any particular rediscount transactions so long as the banks conform to the provisions of section 13 of the Federal Reserve Act and the regulations of the board made in accordance therewith. The mere fact that a paper is technically eligible for rediscount does not impose any obligation upon a Federal Reserve Bank to rediscount it, for under the terms of section 13, no discount operation is mandatory.

### Matter of Local Selection

"Under the provisions of section 4 the banks are required to show no partiality in the matter of extending loans and are directed to extend to each member bank such discounts, advancements and accommodations as may be safely and reasonably made with due regard for the claims and demands of other member banks. Thus it is obvious that a Federal Reserve Bank might, in its discretion, decline to discount for one of its members paper of the same class which it might take from another, or might in its discretion decline to discount any paper which it deems to be an undesirable asset.

"The board has no information as to the alleged action of the Federal Reserve Bank of Kansas City in declining to rediscount certain automobile paper, but assumes that if any such discounts were refused it was done in the exercise of that discretionary power necessarily conferred upon each Federal Reserve Bank. Since war restrictions were removed the Federal Reserve Board has not undertaken to distinguish between

(Continued on page 1037)



## Peugeot Develops New Racing Models

Indianapolis Cars Now on Water  
—Ballot Cars Delayed, but  
Near Completion

PARIS, April 15—(Special Correspondence)—The track record for 500 miles will be broken at Indianapolis on May 31, declares André Boillot, who is to drive one of the three 183 cu. in. Peugeot cars just entered in that event. The record is at present held by De Palma with the Grand Prix Mercédès, which averaged 89.84 miles an hour in 1915. Boillot claims that the new Peugeot cars, although much smaller than the Mercédès built in 1914 are faster than the German production. The cars are lighter than those of a year ago and ought to be able to cover the distance with only one stop for tires and gasoline.

Boillot predicts that, with the keen competition this year, the more highly efficient engines and the lower weight and the better balance, the 500-mile record which has stood for five years will go by the board, with minutes to spare.

The Peugeot racing mounts are the finest looking machines ever produced by the racing department of the famous French firm. With a very low center of gravity, narrow radiator, staggered seats giving the minimum width, and complete streamlining, they give a wonderful impression of speed and stability. To get weight low down and to diminish head resistance, all the gasoline is carried alongside the propeller shaft. Front wheel brakes are used.

The engine is an entirely new production having four block cast cylinders measuring 80 x 149 mm. There are three camshafts and 20 valves for the four cylinders. Engine and gearbox form a unit attached directly to the frame members without the use of a sub-frame. The cars have been thoroughly tested on the road and are reported to be very fast and to have a remarkably quick pick-up. Boillot and Goux will leave for New York on the Lorraine April 17. Their three cars are being shipped on the same date by another steamer.

### Syndicate Delayed Ballot

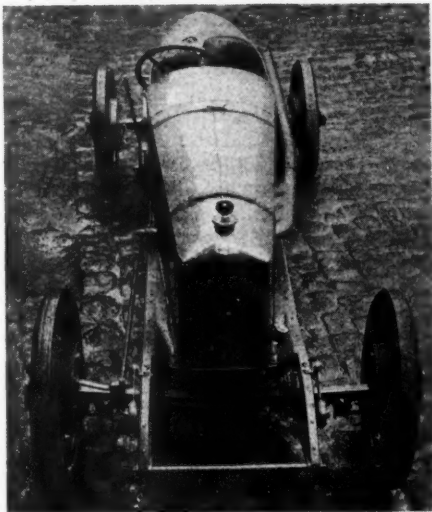
The French syndicate of automobile manufacturers is responsible for the delay in the completion of the Ballot cars prepared for the Indianapolis race.

"Last September," declares M. Ballot, "when I announced my intention of building racing cars, the French Syndicate of Automobile Manufacturers informed me that they did not wish any of their members to take part in racing during the year 1920. As I am not a member of this syndicate, for I only manufacture engines and not complete cars, I notified them that I did not attach any importance to their decision. Immediately I was informed that if I built racing cars I should be shut out of every show, exhibition or race held in France.

"In face of this threat I held back my program until the month of December, when the official French association of manufacturers informed me that the order against racing applied to home events and not to contests abroad. I got to work with the loss of three months, owing to this jealous attitude of the official body."

Every effort is being made to regain the lost time, but it is certain that the Ballot cars cannot be on the track until about one week before the race and consequently are likely to be at a disadvantage compared with other firms.

### The Peugeot Racer



### Says Action Is Not National

(Continued from page 1036)

credits for essentials and non-essentials and has issued no ruling based upon such a distinction. Nor has it made any suggestion to the Federal Reserve Banks that they should necessarily draw any distinction of that character.

"While the board has ruled that automobiles do not come within its definition of 'readily marketable staples' and are not therefore eligible as a basis for bank acceptances against warehouse receipts, nevertheless the board has distinctly called attention to the fact that this ruling does not preclude the rediscount of notes, the proceeds of which have been used to finance the purchase of automobiles, or the discount of acceptances secured by bills of lading covering automobiles in process of shipment provided that such notes and acceptances otherwise conform to the terms of the law and the regulations of the Federal Reserve Board."

### CHICAGO CONTINUES LOANS

CHICAGO, April 27—Officers of the Chicago Federal Reserve Bank disclaimed to-day any knowledge of the action of the Kansas City Bank. It was said that since the armistice no effort had been made to differentiate between essential and non-essential industries. Paper of all kinds is treated strictly upon its merits.

## Duesenberg Breaks More Speed Marks

Special 16-Cylinder Car Driven  
by Milton Shows Tremendous Power

DAYTONA, FLA., April 27—Tommy Milton is busily engaged shattering world speed records at Daytona Beach in a special 16-cylinder Duesenberg car. He made a mile Saturday in 23.60 and two miles in 47.16, only to hang up new marks to-day when he covered the shorter distance in 23.07 and the two miles in 46.24. All his trials are being officially timed by Fred J. Wagner, representing the A. A. A. contest board. The previous records for these distances were made in a special Packard car by Ralph De Palma, who covered the mile in 24.02 and two miles in 49.54.

Milton wrecked the three, four and five-mile records Sunday. He covered three miles in 1.12.18; four miles in 1.26.4, and five miles in 2.00.04. Previous records, held by Ralph De Palma, were: One kilometer, 14.86; three miles, 1.15.04; four miles, 1.39.77, and five miles, 2.04.58. Milton also reduced his own world's record for the half-mile and the mile, doing the half in 11.86 and the mile in 23.56.

In the Duesenberg driven by Milton are two 8-cylinder engines placed side by side, each driving one rear wheel. The piston displacement is 583.8 cu. in.

### Kansas City Bans Loans

(Continued from page 1036)

The dealers in Kansas City are awake to the perils in the situation and the board of directors of the Kansas City Association will take immediate action.

"The dealers must stand together on this," said W. J. Brace, president of the Hudson-Brace Motor Co., although it happens that his company is in position to go through the coming period without being hampered by the Federal Reserve action. "Whatever happens to any dealer, has an adverse effect on all dealers. It's no advantage, but an ultimate detriment to me to have the smaller dealer, not yet firmly established, get into trouble because of this action."

Bankers and dealers say frankly, that if the Federal Reserve ruling continues in force many dealers will be going out of business.

Motor securities company paper has never been re-discountable at the Federal Reserve banks, but this form of motor car financing is being affected quite as seriously as any other. One or two securities companies have gone out of business in the past year and several others are very sharply curtailing their operations.

"Banks and securities companies are discovering that motor car credits have been carelessly handled," said one banker. "The lack of careful credit work in the financing of car and truck purchases, was not particularly disastrous the past few years. But they can't get by now on slipshod credit methods."

## France Prohibits Car Importation

Move Is Made to Re-establish  
Industries and Stabilize  
Exchange Rates

PARIS, April 26 (Special Cable)—The French government has decided to prohibit the importation of automobiles.

The foregoing cable, which was sent by W. F. Bradley, the European Correspondent of AUTOMOTIVE INDUSTRIES, at Paris, was the first notice of such action to reach New York, and it was received with great interest by automotive export firms. Previous rumors, through press dispatches, said France might declare an embargo on luxuries of all kinds in an effort to restore the exchange rate to a better figure. But representatives of the French government at New York, as well as Franco-American business organizations and exporters, were without information that automobiles had been classed in that category.

Attention was called by the National Automobile Chamber of Commerce to the fact that France had just increased the customs duties to 172 francs 50 centimes on automobile bodies weighing more than 2500 kilos, from 82 francs 50 centimes, and on bodies of less weight to 45 per cent ad valorem on the c.i.f. value at the port of entry. General customs on all automotive imports had been increased several months ago.

Shipments of American cars into France during the year 1919 totalled 866 cars valued at \$1,999,773, according to American official figures, while the truck exports numbered 3521 with a value of \$15,143,226. The figures for January and February of 1920, the last so far available, were:

	Cars.		Trucks.	
	No.	Value.	No.	Value.
January .....	28	\$128,619	22	\$44,760
February .....	87	133,637	80	261,622

The embargo was viewed as a further step by France in her effort to re-establish her industries on the pre-war basis and to stabilize exchange. This, in the opinion of French financiers, would be made possible by a cessation of unnecessary expenditures outside the domestic borders. Luxuries—of which silks and similar textile products have been particularly mentioned—were estimated by French Minister of Commerce Isaac, to represent a yearly importation of some 1,300,000,000 francs. The rate of exchange on francs is quoted at 17.02, compared with the normal of 5.10.

### GEMMER CAPITAL \$2,000,000

DETROIT, April 23.—Gemmer Manufacturing Co., Detroit gear manufacturers, has increased its capital from \$500,000 to \$2,000,000. Of the increase \$500,000 will be used in declaring a 100 per cent stock dividend at the annual meeting July 1. The remainder will be held as treasury stock and will be used in extensive expansion plans contemplated by the company.

The capacity of the plant has been utilized in the manufacture of steering gears for sixty customers numbering the leading automobile concerns, and with the greatly increased production schedule for 1921 in prospect, it became apparent the company would have to have more room to comply with this demand. In deciding on extensions to meet the increased automobile production demands the company decided to equip itself to care for new accounts.

## Find Screw Products Mostly on Inch Basis

NEW YORK, April 26—The commission sent abroad last summer by the American Institute of Weights and Measures to investigate the possibilities of international standardization of screw products, estimates that 80 per cent of the screw products of the world are now made on the inch basis.

Inquiry in England disclosed a strong sentiment among industrial leaders against abandoning their established system of weights and measures. It was learned that the Sideley-Deasley Co., large automobile manufacturers at Coventry, had started on the metric system when they took over certain foreign types of machines but have since changed over and are working entirely under the British system.

Sir Auckland Geddes, recently appointed British ambassador to the United States, declared himself against the metric system when he was president of the British Board of Trade.

## Sterling Reduces Tire Price Scale

NEW YORK, April 26—The Sterling Tire Corp., Rutherford, N. J., has reduced prices on several sizes, the decrease ranging from \$2 on some sizes to \$10 on others. Its 30 x 3½ fabric shows a decrease from \$36 to \$26.60.

The following comparative list shows the sizes affected by its April 10 prices:

Size	Jan. 1, 1920.		April 10, 1920.	
	Fab.	Cord.	Fab.	Cord.
30x3	25.00	....	22.00	....
30x3½	36.00	....	26.60	....
32x3½	40.00	45.00	35.00	44.50
31x4	41.00	....	36.00	....
32x4	....	60.00	36.00	56.55
33x4	....	62.00	....	58.00
34x4	....	63.00	....	59.60
32x4½	....	68.00	....	63.70
33x4½	67.00	70.00	65.00	65.35
34x4½	70.00	72.00	66.00	67.05
35x4½	71.00	73.00	67.00	68.75
36x4½	72.00	74.00	68.00	70.35
33x5	....	85.00	....	79.55
35x5	83.00	90.00	80.00	83.40
37x5	87.00	95.00	85.00	87.40
36x6	....	130.00	....	119.35

### NEW GENERAL TRACTOR HEAD

NEW YORK, April 27—At a meeting here of the directors of General Tractors, Inc., of Chicago, Russell S. Tucker was elected president and treasurer to succeed W. N. Smith who will continue as president of the Monarch Tractor Co. of Watertown, Wis., and Monarch Tractors, Ltd., of Brantford, Ont. General Tractors is the holding company operating plants at Watertown, Paulsboro, N. J., and Brantford.

## Ford to Reorganize, Stock \$100,000,000

Corporation Will Combine Two  
Companies and Add Aircraft  
and Street Cars

LANSING, MICH., April 27—Henry Ford and his family will reorganize their interests by the formation of a new corporation in Delaware which will have a capital of \$100,000,000. Formal notice of the step intended was contained in an application filed with the secretary of state here to-day for permission to do business in this state.

The new company will be authorized to manufacture aircraft, internal combustion engines and railroad cars as well as automobiles, trucks and tractors. It will be chartered in Delaware because the laws of Michigan do not permit any company to have a capital of more than \$50,000,000. It is understood that all the capital stock will be held by Mr. and Mrs. Henry Ford and Edsel Ford.

The purposes of the new company caused no surprise for it has been known for some time the Fords intended to enter the aircraft field. There have been many rumors about their purposes along this line but no authoritative statement. They also have developed a gasoline driven street car which is designed to lower materially the costs of operation.

Formation of the \$100,000,000 corporation will be by consolidation of two companies having a total capital of only \$3,000,000. The present capital of the Ford Motor Co. is \$2,000,000, while that of the Henry Ford & Son Corp., formed originally to make tractors, is \$1,000,000.

### COMPRESSION TUBE TO BUILD

PITTSBURGH, April 24—Plans are being made by the United States Compression Inner Tube Co., a corporation of Tulsa, Okla., to build a puncture-proof inner tube factory in Pittsburgh or its immediate vicinity. H. B. Eyer, representative of the corporation, has opened offices in the Wabash Building. In recommending a site for approval of the company's officials and preparing for distribution of the tubes, Eyer will be assisted by W. H. Lessig and J. H. Blake of Tulsa.

The Tulsa factory will have a production of 4,000 tubes and 1,000 casings daily when the maximum capacity is attained, and Eyer says the Pennsylvania plant will be a replica of the Tulsa factory.

Patents for the tube have been granted in the United States, Argentina, Australia, Brazil, Great Britain, France, Italy, Mexico, Spain, Denmark and Canada. Patents are pending and are expected to be issued in Belgium, Cuba, Holland, Russia, Sweden and Switzerland.

The plant here will be the third unit of the organization. Plans have been made for extensive production.



## INDUSTRIAL NOTES

**Black & Decker Mfg. Co.**, Baltimore, has opened a northwestern branch office at 169 Massachusetts Avenue, Boston, which will be in charge of D. G. Caywood. A service station will be maintained in the same building.

**Vacuum Muffler Corp.** has moved its general offices in New York from 154 Nassau Street to 68 Broad Street.

**Monroe Steel Castings Co.**, Monroe, Mich., has been purchased by a syndicate headed by A. Von Eschen, superintendent of the Michigan Steel Castings Co., Detroit, and C. F. Clark.

**Superior Auto Radiator Works** has been organized at Newark, N. J., to manufacture automobile radiators and similar metal specialties.

**Haynes Automobile Co.** has been delayed in the completion of its new factory for the manufacture of baby Haynes by the difficulty in transporting building materials. The plant is designed to meet the demand for lighter cars.

**Emerson-Brantingham Implement Co.**, Rockford, Ill., has opened a permanent exhibit of tractors and other farm machinery at Grand Central Palace, New York.

**Frisbie Motor Co.**, Middletown, Conn., announces an increase in the price of Frisbie valve-in-head marine motors. This is the first advance in prices made by the company in two years.

**Evinrude Motor Co.**, Milwaukee, has announced price increases of about ten per cent in its outboard and inboard type of marine motors.

**Aluminum Manufacturers, Inc.**, successors to the Aluminum Castings Co., has decided to establish its eastern sales office at its Fairfield, Conn., plant. Except for permanent mold castings practically all orders and estimates for the eastern district are executed at this plant.

**Electric Storage Battery Co.** has removed its New York office from 100 Broadway, where it had been for twenty-two years, to the National Association Building, 23 West Forty-third Street.

**Hall Motor & Machine Co.**, Hannibal, Mo., has changed its name to Hall Battery Co. and will give up all automobile work because of the increase in its battery business.

**Northwind Spark Plug Corp.** has been formed to take over production of the Northwind spark plug on a commercial scale and has established a plant at Union Hill, N. J.

## WHEELLESS TRAILER ON MARKET

**STANLEY, WIS.**, April 26.—The Wheelless Trailer Co. of Stanley, Wis., has been organized with a capital stock of \$25,000 and will manufacture a new type of trailer, designed by O. W. Henderson, who has been building it on a limited scale for several months. An existing building has been acquired and will be remodeled and re-equipped. The

Wheelless trailer has the appearance of a rack quickly attached or detached from the rear of a passenger car or truck. It consists of two beams which rest on the rear axle, the front ends being attached to the frame a few feet in front of the axle. Across the ends of the beams extending behind the car there is a box or rack, spring supported, to carry about 500 lbs. of additional freight, such as milk cans, trunks, bags or other luggage.

Franklin to Increase  
Stock to \$40,000,000

**SYRACUSE, N. Y.**, April 27.—A special meeting of the stockholders of the H. H. Franklin Mfg. Co. has been called to vote on a proposal to increase the capital from \$7,000,000 to \$40,000,000 which already has been approved by the directors. It is proposed to increase the preferred from \$5,000,000 to \$15,000,000 and the common from \$2,000,000 to \$25,000,000. Details of plans for future expansion in addition to those already under way have not been disclosed.

The industry now is the largest in Syracuse with 5000 employees and this number will be increased by 1000 within a year. The manufacture of 1-ton trucks, in which the experimental work is almost completed, will be carried on by a separate corporation with which the new financing has nothing to do. Present production schedules call for 63 complete passenger cars a day and this number will be raised to 81 a day.

## AUSTIN PRICES ADVANCE

**LONDON**, April 10 (*Special Correspondence*)—Considered in terms of various commodities, money is cheap today. Thus, for instance, the "Austin Twenty" car, which was once expected to be equivalent of £495, is now priced at £695, a further advance of £100 having been found necessary.

The new prices affect all cars not yet delivered. They are as follows:

"Austin Twenty" touring car....	£695
Coupe .....	850
Landaulet .....	875
Chassis only.....	550

The Austin farm tractor will in future be sold at £360.

## START DIXIE HIGHWAY LINK

**CHATTANOOGA, Tenn.**, April 24.—Steps have been taken to start work at once on the last section of the Jacksonville-Waycross link in the Dixie highway. Work is already under way on the mountain sections between Nashville and Chattanooga, on the western division and on the eastern division between Cincinnati and Knoxville.

## RECORD COTTON PRICES

**PHOENIX, ARIZ.**, April 24.—All previous high prices for long staple cotton, used in manufacture of thread and of fabric for motor car tires, are believed by local dealers to have been broken here when cotton companies announced purchase of 33 bales at \$1.25 per pound.

## METAL MARKETS

**Pig Iron**—Although several large-sized transactions in which merchant furnaces were the sellers, have come to light, very little business for delivery in the last half of the year has so far been consummated. With foundry iron selling at around \$45 many consumers can see no reason for undue speed in placing orders. It is becoming apparent, however, that there is a large suppressed demand and, if this should manifest itself simultaneously, runaway conditions are possible.

**Iron and Steel**—With the improvement in transportation conditions, mills are beginning to quicken production although it will be some time before they are back to the rate of output that prevailed before the strike tied things up. The larger independent producers have not yet formally opened their order books for third quarter deliveries, although some sales to particularly large customers are reported to have been made. In such business as has been placed for automobile sheets, prices are said to be about 2 cents a pound above the levels fixed last year by the Industrial Board and which scale of prices continues to be faithfully adhered to by the leading interest. The placing of large orders for ferro-alloys that enter chiefly into steels used for automotive purposes, reflects a strong demand from that quarter.

**Aluminum**—The market continues firm with the sole American producer's quotation for 98 to 99 per cent pure virgin ingots remaining at 33 cents. Gossip continues that some foreign or resale metal can be had at lower figures but buyers who have scoured the market, report that they find invariably a fly in the ointment of such offers.

**Copper**—Large consumers are supplied until July and are sitting back serenely awaiting developments. Producers say that, when these consumers enter the market, advances are certain to ensue. On the other hand, resale interests contend that this will merely help to clean up part of the surplus now in dealers' hands. Casting copper has been in better demand of late than either lake or electrolytic.

**Tin**—Amid seesaw conditions resulting from continuing speculation in the foreign markets and the ups and downs of exchange, the market for Straits receded in the week between April 15 and April 22, more than 5 per cent No. 1 Chinese has been sold at 60 cents.

**Lead**—Much lead has been sold for third quarter delivery at 8.25 and 8.35 cents, East St. Louis basis. Some Mexican lead is being offered.

**Zinc**—The zinc market is in the doldrums, the chief cause being the lack of export demand.

**Brass**—The labor situation in the Connecticut Valley brass mills continues to impede output and the falling off in production is a source of serious inconvenience to many consumers.

## Automotive Financial Notes

**Rainier Motor Corp.**—President Rainier reports that based on present producing capacity net earnings for year should not be less than \$1,000,000. Godfried Piel, president of Piel Bros., has been added to directorate.

**Martin-Parry Corp.**—Declared usual quarterly dividend of fifty cents a share. Sales for first quarter amounted to \$1,149,000 compared with \$700,000 in first three months of last year.

**Middle States Rubber Corp.**—Capital increased to \$2,000,000 and will manufacture tires in addition to tubes.

**Kennedy Corp.**, Baltimore.—Organized with \$2,000,000 capital to make cylinders, gear cases and other parts for various types of automobiles. Will build plant on 4½ acre site on waterfront with four open-hearth melting furnaces and seven annealing furnaces.

**Bacon Motors Corp.**, New Castle, Pa.—Will capitalize at \$2,000,000 to make passenger cars. One factory unit has begun production and two others are planned.

**Commercial Truck Co. of America**, Philadelphia.—Capital increased to \$4,000,000 of which \$1,000,000 has been paid in. Extensions proposed to increase output fivefold.

**Federal Motor Truck Co.**—Declared stock dividend of 100 per cent payable May 1. Cash dividends paid to April 1 were twelve per cent.

**Stromberg Carburetor Co.**—Annual report shows net profits after charges and Federal taxes of \$401,328 or \$5.34 a share on 75,000 shares of capital stock of no par value.

**Timken-Detroit Axle Co.**—New \$10 common stock sold high at \$63.25 on its first day on the local exchange, after par was reduced from \$100. These figures compare with \$575 bid and \$580 asked for the old stock last week.

**Benton Harbor Forging Co.**, Benton Harbor, capitalized at \$200,000, to manufacture forgings and castings. Fred A. Fuller is president.

**Jamcap Rim Tool Corp.**—Incorporated at Boston for \$250,000 to manufacture automobile equipment.

**Maibohm Motors Co.**—Reports net earnings at the annual rate of forty-eight per cent for first quarter of 1920. Net business showed an increase of sixty-eight per cent over previous quarter.

**Hamilton Motors Co.**, Grand Haven, Mich.—Capital increased from \$500,000 to \$1,500,000, proceeds to be used in enlarging factory for increased production of Apex line of commercial vehicles. Adolf Pricken, connected with shipping and warehouse operations in New York, has been elected president.

**Miller Rubber Co.**—Reports sales for March aggregating \$3,600,000.

**Meyer-Kiser Corp.**—Capitalized for \$1,500,000 at Indianapolis for automobile funding and general business in buying and selling commercial paper.

**Stewart-Warner Speedometer Corp.**—Declared regular quarterly dividend of \$1 per share.

**Tiger Cord Tire & Rubber Co.**, Akron.—Incorporated with capital of \$2,000,000 to manufacture tires and tubes. Proposes erection of factory at once.

### Motor Wheel Declares Initial Dividends

LANSING, MICH., April 26—Motor Wheel Corp. directors at the April meeting last week declared a 50 per cent stock dividend from surplus earnings, and a 2½ per cent cash dividend on common stock. The cash dividend is payable May 20 to stockholders May 10, and stock dividend is payable June 1 to stockholders May 15.

The dividend action is the first since the merger of Prudden Wheel Co., Auto Wheel Co., Weis & Lesh Mfg. Co. and the Gier Pressed Steel Co. The sales department reported at the meeting sufficient orders on the books to require full time operation for the next 10 months. The directors reported that a rearrangement of the executive departments and development of the reorganization plan is progressing rapidly. Most of the old stock of the different companies has been transferred. The dividends declared apply only to the new stock.

### Elgin Motors to Pay 5 Per Cent for Quarter

CHICAGO, April 24—The Elgin Motor Car Co. has decided to pay a 5 per cent cash dividend out of the earnings for the first quarter of 1920 and if strikes or other abnormal conditions do not interfere other cash disbursements will be paid during the year. An extra stock dividend also is probable in the near future for the stockholders have authorized an increase in the capitalization from \$3,500,000 to \$10,000,000.

C. S. Rieman, president and general manager, reported a steady increase in the volume of business and showed that in the month of March the company built and sold more than \$1,000,000 worth of automobiles. Net profits for that month, the report showed, were at the annual rate of 52 per cent on the outstanding stock while the rate for the quarter was 37 per cent.

### CHANDLER TO VOTE DIVIDEND

NEW YORK, April 26—A meeting of the directors of the Chandler Motor Car Co. has been called for May 5 to consider action on a stock dividend. There are reports, which it has been impossible to confirm, that the disbursement may be as large as 33 1-3 per cent. Action will be taken in June on the quarterly cash dividend.

Earnings in the first quarter of this year are officially estimated at \$2,500,000 or at the rate of \$10,000,000 annually before taxes. This would be equivalent to almost \$48 a share on the present capitalization of 210,000 shares and better than \$35 a share on a basis of 285,000 shares outstanding if a stock dividend of 33 1-3 per cent is declared.

In the three months ended March 31, 1920, 7,373 cars were shipped. For the week ended April 12, 544 cars left the factory and despite the railroad strike production is being maintained at a high pitch.

### Bank Credits

*Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.*

The Kansas City Federal Reserve Bank will make a specific effort to curtail the passenger automobile industry as being, in its opinion, partly a non-essential industry. This move is in connection with the initiative that the Kansas City bank has taken in exercising the power to fix lines of credit to member banks under the recent act passed by Congress.

It would not seem that the Kansas City plan could be adopted in New York, so long as the New York Reserve Bank is lending money to other Reserve banks. It would hardly be fair to New York business. The New York Reserve Bank last Saturday was lending approximately \$64,000,000 to other Reserve banks, a gain for the week of \$27,500,000. In spite of this and of exports of gold, it gained \$32,000,000 in gold reserves, at the expense of Western and Southern banks. The system as a whole lost \$4,000,000 in gold.

It is impossible to say how far domestic gold movements are due to commercial influences and how far to government financing. In the New York Clearing House Bank's weekly statement, loans declined \$72,000,000 following an increase of \$77,000,000 the preceding week. Excess reserves rose by nearly \$12,000,000. Stock exchange liquidation doubtless had some part in the loan decrease.

The general credit situation remains essentially unchanged, with the probability that interest rates will continue at present levels.

### HUPP STOCK SHOWS STRENGTH

NEW YORK, April 27—Recent strength on the Stock Exchange of the stock of the Hupp Motor Car Corp. is attributed to its largely increased earnings. It is expected the net profits for the fiscal year ending June 30 will exceed \$3,000,000 after all charges and Federal taxes. After preferred dividend requirements this balance would equal more than \$5.50 a share on the common outstanding. The net profits last year were \$535,602. The estimated production of cars for this year is 22,000 as compared with 17,442 last year.



## Men of the Industry

**Ralph S. Allen**, recently elected vice-president of the Duratex Co., Newark, N. J., is general manager of the company as well.

**H. J. Crean**, assistant secretary-treasurer of Fisher-Walker, Ltd., Sandwich, Ontario, has been appointed assistant to the president of the Collier Motor Truck Co., Bellevue, Ohio.

**F. A. Rendon** has been appointed export manager of the International India Rubber Corp., South Bend.

**L. M. Baker** has resigned as supervisor of sales of the motor equipment division of the Hyatt Roller Bearing Co. to take over the exclusive representation of the Dittmer Gear & Mfg. Co. in Michigan, with offices in Detroit.

**Karl M. Wise** of Detroit has been appointed consulting metallurgist of the Russel Motor Axle Co.

**George S. Shugart**, general sales manager of the United States Tire Co., has been named vice-president of the company.

**Morgan Harding**, Detroit sales manager of the Aluminum Manufacturers, Inc., has resigned. Harding has become interested in the Co-Statley Manufacturing Co. of West Haven, Conn., as sales manager. He will be succeeded by L. T. Youngs, manager of Michigan sales for the Aluminum Co. of America.

**H. W. Zimmerman** of the Cadillac Tool Co. of Detroit, has organized a company at Milan, Mich., to manufacture tools. M. H. Hack is president and Allan Johnson, secretary and treasurer.

**David H. Chreider**, president of the Michigan Metal Supply Co., has sold his interest in the company to E. M. Welker, who has been elected president. A. M. Welker has been elected vice-president and M. A. Morgner, secretary-treasurer.

**Frederick I. Lackens**, former secretary of the Toledo Commercial Club, has been appointed advertising manager of the Allen Motor Co. at Columbus, Ohio.

**L. J. Seebach**, who has been managing the Brooklyn branch of the Willys-Overland Co., has been made manager of the New York branch succeeding George E. Smith, who recently became retail manager for Guy O. Simons in Detroit.

**Guy DeLong**, former chief of Maxwell Motor Co.'s school for motor mechanics, has returned to Detroit from Haiti, where he has been supervising service for Joseph Murad & Son, Maxwell distributors.

**H. W. Usherwood** has been appointed assistant to Harry S. Daniels, advertising manager of the Dort Motor Car Co., at Flint.

**E. W. Kronbach** has severed his connection with the Aluminum Manufacturers, Inc., at Cleveland. No successor has been named and Kronbach has not announced his future plans, but for the present he is at 1195 East 125th Street, Cleveland.

**J. P. Brennan**, former state treasurer of Ohio has assumed his duties as secretary of the Columbus Tire & Rubber Co.

**Archibald Black**, formerly of the Navy Department, and his brother, Donald R. Black, have opened an office in the Evening Star building, Washington, as consulting engineers on airplane and light motor vehicle problems.

**G. J. Eyler** has been appointed sales promotion manager of the Service Motor Truck Co., Wabash, Ind.

### Paris Correspondent to Study Industry Here

NEW YORK, April 28—W. F. Bradley, Paris correspondent of AUTOMOTIVE INDUSTRIES and the other Class Journal papers, will arrive in New York about May 8. He will spend several weeks in automotive circles in the United States and will witness the Indianapolis race. His visit is for the purpose of gaining first-hand information of the industry that he may better interpret Continental developments and trends for the readers of Class Journal papers.

### Taylor Society to Discuss Management

NEW YORK, April 26—The Taylor Society, national organization for the promotion of scientific management in industry, will hold a three days' conference in Rochester, N. Y., on May 6, 7, and 8. The meeting will be under the auspices of the Industrial Management Council and the Manufacturers' Council of the Rochester Chamber of Commerce. A number of prominent manufacturers, industrial engineers, and labor authorities will speak and participate in the round-table conferences which are to be held outside of the regular sessions.

Ernest Martin Hopkins, president of Dartmouth College, Dr. Meyer Jacobson, labor manager of the Stein-Bloch Co., Dr. William Leiserson, chairman of the Labor Adjustment Board, Rochester Clothing Industry, and Frank M. Gilbreth will be among the speakers.

### Too Many Press Agents, Says Publishers' Group

NEW YORK, April 24—Much of the time of the American Newspaper Publishers' Association was devoted at its convention here this week to discussion of the question of free publicity. Members contended that the enormous increase in the number of press agents, together with the acute shortage of print paper, made the problem more pressing.

Some publishers contended all press agent mail should be consigned to the waste basket before it reached editors' desks while others held that the amount of space given sporting events should be sharply curtailed. Opponents of the present sporting page policy asserted that when such affairs were held for profit the promoters should be compelled to pay for the space they get. A few went so far as to hold the ban should apply to professional baseball.

There also was criticism of free publicity for automobiles, moving pictures and books. The arguments presented covered a wide range and it was evident the publicity man had few friends on the floor of the convention.

### ZIMMER JOINS DUPONT

WILMINGTON, DEL., April 26.—R. A. Zimmer has joined Dupont Motors, Inc., as chief engineer and will be in charge of engineering on the new Dupont automobile, which will be brought out about June 1. He was associated as designer with the Crane Motor Car Co. as long ago as 1904, and more recently has served as designing engineer with the Simplex Automobile Co. and the Wright-Martin Aeronautical Motors Co. Zimmer will succeed John A. Pierson of Metuchen, N. J., who recently resigned as chief engineer for the Dupont company.

### SPOONER LEAVES FREE PRESS

DETROIT, April 23.—F. Ed. Spooner, for eleven years editor of the *Automotive World* column on the Detroit Free Press, has resigned to devote his attention to other interests. Spooner is widely known in the automotive industry, having graduated from the old bicycle squad and having been among those present at every automobile racing event and national show since the industry had its birth. Pressure of other business, including his publicity bureau in Detroit, and his connection with Motor West, published on the Pacific Coast, compelled him to relinquish his post with the Free Press.

### MORRISON GIVEN SEND-OFF

SPRINGFIELD, MASS., April 24.—Andrew J. Morrison, known to his colleagues as "Andy," who May 1 goes with the International Motor Truck Co. as engineer of works, was given a send-off to-day at the plant of the J. Stevens Arms Co., Chicopee Falls, where he has occupied a similar position.

### EUROPEAN AIR LINES START

NEW YORK, April 24.—Information concerning the formation of two new commercial air lines in Europe within the last few weeks has been received here. One of these, in Spain, was inaugurated on April 1 as the first aerial postal service in that country. The mail will be carried between Barcelona, Alicante and Malaga on the Frejus-Toulouse-Rabat line. The second is a plan for a postal service between the Netherlands and England.

# Calendar

May 17-22 — Ship-by-Truck — Good Roads Week — May 17-22

## SHOWS

Oct. 6-16—New York. Electrical Show. Grand Central Palace. George F. Parker, Manager.  
Dec. 10-18—New York. Motor Boat Show. Grand Central Palace.

## FOREIGN SHOWS

May 15-June 13—Cars, Parts and Accessories. Antwerp.  
June 26-July 25—Commercial vehicles, tractors, camions and engines. Antwerp.  
July 9-20—London, England. International Aircraft Exhibition. Olympia. The Society of British Aircraft Constructors.  
Aug. 7-Sept. 15—Motorcycles, sidecars, etc. Antwerp.  
October—London. Commercial Vehicle Show. Olympia.  
November—London. Passenger Car Show. Olympia.

## CONTESTS

May 1—Hanford, Cal. Dirt track.  
May 31—Indianapolis, Ind. Speedway.  
May 31—Brockport, N. Y. Dirt track.

June 1—Omaha, Neb. Truck Reliability Run.  
June 12—Uniontown, Pa. Speedway.  
June 17—Portland, Ore. Dirt track.  
June 17-18—Chicago, Inter-Club Run. Chicago Automobile Club.  
June 19—Ogdensburg, N. Y. Dirt track.  
July 4—Tacoma, Wash. Speedway.  
July 4—Hanford, Cal. Dirt track.  
July 4—Spokane, Wash. Dirt track.  
July 5—Batavia, N. Y. Dirt track.  
July 17—Warren, Pa. Dirt track.  
July 24—Watertown, N. Y. Dirt track.  
July 31—Fulton, N. Y. Dirt track.  
Aug. 7—Erie, Pa. Dirt track.  
Aug. 14—Buffalo, N. Y. Dirt track.  
Aug. 20-21—Middletown, N. Y. Dirt track.  
Aug. 21—Johnstown City, Pa. Dirt track.

Aug. 21—Elgin, Ill. Road race. Chicago Automobile Club.  
Aug. 28—Canandaigua, N. Y. Dirt track.  
Aug. 27-8—Flemington, N. J. Dirt track.  
August, 1920—Paris, France. Grand Prix Race. Sporting Commission Automobile Club of France.  
Sept. 1—Glidden Tour—N. Y. to San Francisco.  
Sept. 5—Targa Florio Race. Sicily.  
Sept. 6—Hornell, N. Y. Dirt track.  
Sept. 6—Cincinnati, O. Speedway.  
Sept. 6—Uniontown, Pa. Speedway.  
Sept. 17-18—Syracuse, N. Y. Dirt track.  
Sept. 25—Allentown, Pa. Dirt track.  
Oct. 1-2—Trenton, N. J. Dirt track.  
Oct. 8-9—Danbury, Conn. Dirt track.

May 12-15, 1920—San Francisco. Seventh National Foreign Trade Convention.

May 20-30—Atlantic City. Third American Aeronautic Congress. Aero Club of America.

May 24-26—Indianapolis. Service Managers' Convention. National Automobile Chamber Commerce, Service Division.

June 7-10—Indianapolis, Ind. Annual Convention of the Associated Advertising Clubs.

June 7-11—Del Monte, Cal. Automotive Equipment Association, Directors' Meeting. 7-8; General Sessions 10-11.

June 22-25—Asbury Park, N. J. Annual meeting American Society for Testing Materials.

## S. A. E. MEETINGS

June 21-25—Ottawa Beach, Mich. Summer Conference.

## CONVENTIONS

May 9-12—Independent American Petroleum Congress, Congress Hotel, Chicago.

## MORTGAGE LOAN PLAN TAKEN UP IN BUFFALO

(Continued from page 1029)

be able to get first mortgage loans from banks.

An executive of the Pierce-Arrow Motor Car Co. said to-day that the housing situation had not yet become a company proposition with that concern. It is believed, however, that the automotive industry here will feel acutely the scarcity of houses when the big Dunlop tire plant gets into action, unless the number of houses here is greatly increased in the meantime.

## Kansas City Does Not Find Conditions Acute

KANSAS CITY, MO., April 22—Kansas City has outlined a definite program for finding out whether it has a housing problem. Should it be discovered that industry is being hampered for lack of living quarters for workers, a housing corporation is to be formed, to build houses where needed.

The preliminary investigations are being made by the Chamber of Commerce. A questionnaire was sent to employers of large numbers, seeking definite information as to the employees who wanted places to live, whether they would rent or buy, how much they could pay down on homes, and so forth. Less than 50 per cent of the firms returned any answers, so that data are incomplete.

The lack of full returns indicates, it is interpreted, that the housing problem is not worrying employers. Possibly the problem is not serious regarding workers, for the complaint of inadequate housing may come chiefly from people

wanting better classes of houses. Many new homes are being built in Kansas City by corporations and by individuals, for personal use or for sale. There is said to be more building in Kansas City than in most other cities.

## No Results Apparent From Boston Surveys

BOSTON, April 24—Housing surveys have followed each other in Boston until they are tiresome. Even before the conditions became acute the legislature and the Boston Planning Board took up the matter and tried to plan remedies; but there has been nothing but talk.

Boston has lost cigar, candy and some other plants because of the scarcity of help and housing conditions. One big plant went to Philadelphia and another to New Jersey. When some of the big automobile warehouses and service stations are finished, giving employment to large forces, the industry will be in as serious a way as the others. That will be about next fall.

## Want to Pitch Tents in Philadelphia Park

PHILADELPHIA, April 24—Housing facilities are so inadequate in Philadelphia that business men's associations constantly are holding meetings to express their indignation over the situation. Application has been made by residents of one ward to permit the homeless or those who have been evicted to pitch tents in the George's Hill district of Fairmount Park.

In brief, Philadelphia still is 35,000 dwellings "shy." The Housing Commis-

sion apparently has been marking time, but those on the inside assert that there is nothing else for it to do until building has been speeded up by private enterprise. The automotive field is not as seriously affected as many trades. Most of the motor mechanics received high wages even before the war, as there was a marked scarcity of experts even then. They were of the saving type and quickly purchased their homes, many through building and loan associations.

## Atlanta Considering Sectional Bungalows

ATLANTA, GA., April 22—Men of the automobile and other industries here are giving serious consideration to the housing problem, realizing that comfortable home conditions will alleviate to a large extent the existing industrial unrest.

A number of the larger concerns have taken steps from time to time for the improvement of housing conditions for their employees, and the matter of housing has been discussed considerably by associations, the members of which agree upon the importance of solving the problem. No concerted plan has yet been adopted, however, and the shortage and cost of building materials, together with the shortage of labor and transportation difficulties, have made the problem more difficult of solution.

The Simms Motor Car Corp., which is to establish a factory here for the manufacture of a light, popular priced car, is giving particular consideration to the housing problem. J. H. Simms, vice-president and sales manager of the corporation, is considering the purchase of a large number of bungalows.